

Technical Report 1146

**PC-Based Training To Improve Infantry
Situation Awareness**

**Laura D. Strater, Justus P. Reynolds, Laurie A. Faulkner,
D. Kelby Birch, John Hyatt, Scott Swetnam,
Scott Metzdorf, and Mica R. Endsley
SA Technologies, Inc.**

June 2004

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FOREWORD

The Infantry Forces Research Unit of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) conducts research investigations to identify and understand the challenges presented by the 21st Century digital battlefield. To optimize the allocation of limited financial and temporal resources, endeavors aimed at modernizing Infantry forces cannot be achieved haphazardly, but must be guided by thorough research. By targeting efforts in areas identified by research as most likely to produce significant improvements, maximum benefits can be provided for Infantry forces at a reasonable cost in both financial resources and training time.

This effort sought to apply earlier investigations that identified significant factors contributing to the situation awareness (SA) of Platoon Leaders into a focused training program specifically targeted at enhancing the SA of new Infantry Platoon Leaders. With limited training resources available, both in training dollars and training time, new methods for enhancing existing training are needed. Since information acquisition and usage are integral in attaining and maintaining situational dominance for a fighting force, the development of training programs focused on enhancing SA was targeted for this effort.

This investigation applies earlier research efforts that focused on identifying high-impact target areas for the application of training efforts geared at enhancing the SA of Infantry Platoon Leaders. The training programs developed for this project provide an opportunity for Infantry Platoon Leaders to develop, practice and improve their skills in performing tasks related to the acquisition of superior SA. By leveraging relationships found in prior research between SA and decision making, training is targeted to not only enhance SA, but also to support and improve the decision making process. The research basis of these training modules increases the likelihood that they will target desired skills and result in a fighting force better equipped to identify and respond to the challenges present in the fast-paced environment of Infantry combat operations.



MICHAEL G. RUMSEY
Acting Technical Director

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We offer a special thanks to the personnel of the Royal Norwegian Naval Academy and the Royal Norwegian Army Academy, especially to Dr. Jarle Eid and Dr. Bjorn-Helge Johnsen, of the Royal Norwegian Naval Academy and the University of Bergen, as well as Major Nils Torre Meland of the Royal Norwegian Army Academy for their efforts to coordinate our involvement in their exercises.

Finally, another special thanks goes to Scott Swetnam, John Hyatt, and Scott Metzdorf for their invaluable assistance in acting as subject matter experts for this project. The combined contribution of these three individuals was vital to the success of this program.

PC-BASED TRAINING TO IMPROVE INFANTRY SITUATION AWARENESS

EXECUTIVE SUMMARY

Research Requirements:

With the increasing incursion of various products of information technology onto the Infantry battlefield, warfighters at lower levels of the Army echelon will be required to sort through masses of data to identify those critical pieces of information which make the difference between blindly reacting to situations as they develop and understanding the developing situation and being able to predict what will happen next. Infantry Platoon Leaders, in particular, tend to be relatively inexperienced in military operations, yet are called upon to lead troops, often in the front lines of developing tactical situations. With the concomitant drive to push decision making further down the echelon, these inexperienced Platoon Leaders will increasingly be called upon to function at high levels of effectiveness in an information-rich, complex and dynamic environment. Success in Infantry missions requires acquiring intelligence information from a variety of sources, selecting from among competing and often conflicting cues to identify key information to assist in the development and implementation of plans, and doing it better and faster than the enemy. Situation awareness (SA) provides the framework for this process, allowing the warfighter to rapidly assimilate and employ available information to improve critical combat factors such as lethality, survivability, security and communications. Despite a significant emphasis by the Army on improving SA across all echelons, no current training programs exist which are specifically geared to enhance SA.

The objective of this investigation is to apply prior research aimed at identifying areas where training can be employed to reduce deficits in SA, particularly among inexperienced officers, and to develop this into training modules aimed specifically at enhancing SA. Since Infantry Platoon Leaders are often relatively inexperienced warfighters, yet are responsible for leading troops into potentially volatile situations, these officers were selected as the focus for the training applications. Platoon Leaders generally direct their troops from a vantage point not far removed from the forefront of the action. Thus, they operate in a harsh, stressful and complex environment where they must attend to multiple sources of information, prioritize among competing goals, make rapid decisions and take action to implement their decisions. Under these mentally, physically, and psychologically stressful conditions, providing the warfighter with both the skills and an increased confidence in his ability to develop superior SA adds another powerful weapon to his available arsenal.

Procedure:

The current investigation looked at transitioning earlier research on the acquisition of SA among Infantry Platoon Leaders into training programs aimed at enhancing this process. Specific skills targeted for improvement include time management and task prioritization,

communications processes, contingency planning, and the development of knowledge bases and schemata to enhance pattern-matching skills. Two training modules were developed here, and validation testing was done in two phases, first at the US Military Academy to target usability issues, then later in field exercises using Norwegian Army and Navy cadets.

Findings:

Despite limited use of the program, some training effects were seen among cadets at the Norwegian Naval Academy. Only two of eight squads successfully identified a suspected special forces camp as a refugee camp, and refused to attack the camp. Both of the successful squad leaders were exposed to the SA training module. Analysis of videotape of the exercises indicates that this may not be simply a reflection of better SA on the part of the trained squad leaders, it may be a more accurate reflection of the confidence of the squad leaders in their own SA, and a willingness to take action based on this confidence.

Additionally, subject self-evaluations of SA also showed a training effect, with trained warfighters indicating that they had to work harder, mentally, to develop the highest levels of SA, predicting what would occur next, as well as to determine how best to achieve their mission goals. Although the objective of any training program is to reduce the effort necessary to acquire the skills being taught, in this particular case this is viewed as a good result. Even trained cadets received only an average of approximately 2 1/2 hours of training. This amount is not sufficient for the development of schemata and knowledge bases, however, these subjective results show that it is sufficient to equip trainees with an understanding of the cognitive effort necessary to acquire a superior understanding of the situation, and with the willingness to expend this mental effort.

The investigation indicated that the training program is targeting enhancements in both the trainee's SA itself and the trainee's confidence in their assessment of the situation. This effort demonstrates that effective programs can be developed to train the skills necessary for the acquisition of SA. It provides further proof that SA can be successfully studied in the light Infantry environment, and demonstrates one possible application of research results from such studies.

Utilization of findings:

These findings can be used to continue to develop training programs specifically designed to improve the SA of Army officers. This investigation utilized three approaches:

1. Targeting SA deficits in new Platoon Leaders identified in prior research,
2. Developing focused training programs, and
3. Validating the programs developed.

By utilizing this structured approach to developing training modules, we can greatly enhance the likelihood that programs developed will target the desired skills and knowledge

bases. Validation of the program provides the capstone of the process, providing support for the efficacy of these training modules.

PC-BASED TRAINING TO IMPROVE INFANTRY SITUATION AWARENESS

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Introduction

The objective of this research effort was to develop and validate an Infantry Situation Awareness Training (ISAT) Program. Situation awareness (SA) is a fundamental requirement for warfighter success both in present and future digital battlefields. SA forms the foundation for military decision making and task execution. In the demanding Infantry combat environment, superior SA will bring tremendous advantages by promoting information dominance, improving security and survivability, and optimizing lethality. The future battlefield calls for advanced technologies, leader development, and training concepts targeted at enhancing SA at all echelons (Endsley et al., 2000; Graham & Matthews, 1998). These goals cannot be achieved haphazardly, however. As Infantry forces draw on technological advances to enhance battlefield information flow, it becomes increasingly important to understand the factors influencing SA in an Infantry environment and the interrelationships among these factors. Experience has proven that more information doesn't necessarily produce better SA or improve situational dominance. The development of technologies and programs that will be successful in creating forces with high levels of SA depends upon a solid foundation of knowledge regarding the key factors that fuel SA in the Infantry arena and on how these factors differ among echelons.

To date, no training programs have been specifically addressed to create and enhance situation awareness in military officers. While in some cases, warfighters are able to develop the needed skills and knowledge bases on their own, in many cases individuals appear to be lacking in SA. Earlier research identified many areas where Platoon Leaders, for example, have significant deficiencies in their situation awareness (Strater, Endsley, Pleban, & Matthews, 2000; Strater, Jones, & Endsley, 2001). In this research report, we will briefly discuss the findings from earlier efforts and then describe the SA training programs identified for addressing SA shortcomings in Infantry officers.

This research was focused on leveraging the results of an earlier program to develop the training concepts identified into deliverable training programs. These training tools are imbedded within the context of Infantry operations, but will be built on fundamental concepts with applicability to other Army operations, other military domains (Marine Corps, Air Force, Navy), and civilian operations (e.g. police, fire fighting, emergency response) that will be explored in subsequent efforts.

What is SA?

In its simplest terms, SA involves knowing what is going on around you, applying that knowledge to understand the current situation and, finally, projecting the impact upon future states of the environment. A widely accepted definition of SA is "*the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future*" (Endsley, 1988, p. 97). This definition encompasses the key concepts that are required to form a complete understanding of SA.

First, SA is comprised of three levels: perception, comprehension and projection. Level 1 SA, perception, involves the sensory detection of significant environmental cues. Level 2 SA, comprehension, involves integrating these environmental inputs into the framework of the individual's goals and objectives to gain an understanding of how these bits of data will impact upon those goals and objectives. It also involves combining the individual pieces of information together to form a comprehensive picture of the world, or specifically, a comprehensive picture of the portion of the world that is of concern to the individual. Level 3 SA, projection, involves extrapolating this information forward in time to determine how it will affect future states of the operating environment (Endsley, 1988; Endsley, 1993).

Additionally, SA has a temporal and locational component. Time is an important concept in SA, as SA is a dynamic construct, changing at a tempo dictated by the surrounding action. In the Infantry, this tempo can vary from quite slow in some environments to chaotically rapid in others. And to increase the challenge, the pace can go from slow to lightning fast in the blink of an eye. Regardless of the tempo, the individual's SA provides a mental representation of the world at a specific moment in time. As new inputs enter the system, the individual incorporates them into this mental representation, making changes as necessary in plans and actions in order to achieve the desired goals. The concept of SA also involves knowledge about the activities and events occurring in a specific location. A Platoon Leader, for instance, will focus only on his own area of operations (AO), though he will naturally have a certain amount of interest in actions occurring in adjacent areas.

Why train SA?

In the fast-paced, increasingly digitized battlefield of the Infantry warfighter, large quantities of information, often conflicting, can bombard the Soldier from all sides. From this amalgamation of data, he must make decisions on what information is correct, what is relevant, and what requires action. The Soldier's SA, his entire set of knowledge of the current situation, provides the framework for these decisions, and is a key element in successful mission execution. Thus, while SA does not directly predict decision making or task performance, Soldiers with good SA will have a significantly higher probability of making good decisions and achieving successful outcomes in their endeavors than will Soldiers with poor SA.

While it is intuitively apparent that SA is critical to good performance in military operations, until recently very little specific information has been available about the key factors for improving SA in this domain. To that end, we initially focused on identifying the key factors that could be trained to improve warfighter SA in Infantry operations. We utilized a four-part strategy for meeting this objective: (1) analysis of existing research and training bases to identify factors associated with high and low SA in Infantry operations, (2) a survey of experienced officers and senior enlisted personnel who train new officers to determine key SA problems areas and skill deficiencies, (3) identification of the best strategies for training SA in Infantry operations, and (4) SA and cognitive skills measurement. The results were fully reported earlier

(Strater et al., 2001), but are briefly summarized here, as our present effort is greatly influenced by these results.

Analysis of Training Data

Ongoing programs to train Infantry personnel in Army simulators and field exercises were surveyed to find usable data for evaluations to determine areas where low SA was apparent. Extensive searches of existing databases identified few previous programs where sufficient data were available to directly assess the SA of the participants or the factors that might have affected their SA. However, a few sources were found that investigated linkages between SA and decision-making performance in Infantry operations.

Data from an earlier study of Platoon Leader SA conducted utilizing mission-based scenarios in a virtual reality simulator (Pleban, Eakin, Salter, & Matthews, 2001; Strater et al., 2000) were analyzed in detail to determine which SA elements might be most important for good decision making and performance in Infantry operations. These data were useful because the investigation employed the Situation Awareness Global Assessment Technique (SAGAT), a PC-based query system that objectively assesses the Soldier on his knowledge of a variety of situational factors during brief freezes in the action, thus providing detailed and direct information on Platoon Leader SA within the context of the scenarios examined. Strater, Endsley, Pleban and Matthews (2000) found that while more experienced leaders were significantly better at identifying locations of both the enemy and units of their own platoon on a map (Level 1 SA), and at identifying the highest threat and the strongest enemy location (Level 2/3 SA), less experienced officers were better at identifying the strongest friendly location (Level 2 SA). As higher levels of SA require cognitive effort and focused attention, this result indicates experienced officers focused their attentional processing on the enemy, while less experienced officers focused their attentional processing on their own troops. This result also provides evidence of a significant difference in the qualitative and quantitative SA of experienced and inexperienced Platoon Leaders that may have significant training implications.

In the earlier effort, available SAGAT data were subjected to a detailed comparison with decision data collected from 14 Platoon Leaders after the SAGAT query sessions. The analysis used 46 discrete decision points, 20 from an Assault scenario and 26 from a Defend scenario. The decision data were categorized into seven decision categories: *Communicates to Commander, Allocates Personnel Appropriately, Requires Communication from Platoon, Coordinates with other Platoons, Conducts Unforeseen Action, Provides Orders to Platoon, and Follows Commander's Orders*. Results of a stepwise regression analysis of these decision categories with the SAGAT queries are shown in Table 1. These results should be viewed cautiously due to the small sample size and potential scenario effects, however, they do indicate some interesting findings related to SA.

Communicates to Commander included decision items such as *No SITREP to CDR* and *Fails to Request Reinforcements*. Poor decisions in these areas were predicted by inaccurate responses to queries regarding the number of casualties suffered by the platoon and whether the enemy knows the platoon location (Level 1 SA), while at the same time they were predicted by

accurate responses to queries regarding the next enemy action and who has the advantage in the current situation (Level 2/3 SA.) Thus, leaders who merely possessed good Level 1 SA (perception) were likely to follow procedures and communicate to the commander as expected, while leaders with good Level 2 and 3 SA (comprehension and projection) were less likely to communicate with the commander, perhaps indicating either a higher confidence in their own abilities and judgments or a false sense of security.

Table 1. Stepwise Regression analysis of Decision Categories with SAGAT

Decision Category	Model	F-Value	P-Value	R ²
Communicates to Commander	My Location Known (-) # of Casualties (-) Next Enemy Action (+) Advantage (+)	5.912	.0010	.403
Allocates Personnel Appropriately	Next Civilian Action (+)	4.956	.0352	.165
Requires Communication from Platoon	Exposed Friendly (+)	2.898	.0948	.035
Coordinates with other Platoons	Weakest Friendly (+)	2.350	.1338	.034
Conducts Unforecasted Action	# Casualties (+) Next Civilian Action (+) Advantage (+)	2.797	.0458	.099
Provides Orders to Platoon	Exposed Friendly (-) Advantage (1) (-) Not in Communication (+)	6.730	.0005	.243
Follows Commander's Orders	Highest Threat (+) My location known (-) # of Casualties (+) Not in Communication (+)	5.367	.0012	.305

*Note: N = 14

Similarly, poor decisions regarding personnel allocation were predicted by accurate responses regarding future civilian actions, a Level 3 SA query. This result is more questionable, however, as civilians had no impact in one of the two scenarios investigated. Leaders were less likely to require communication from the platoon if they knew the location of exposed units within the platoon, a level 2 SA query. Once again, this indicates a higher confidence in their abilities and knowledge. In addition, leaders who knew which of their units was weakest were less likely to coordinate with other platoons. Platoon Leaders were more likely to conduct an unforecasted action, something not anticipated by scenario developers, if they accurately knew the number of casualties (Level 1), could predict the next civilian action (Level 3), and knew who had the advantage in the situation (Level 2.) This may indicate that leaders with better SA across levels are more innovative, able to think beyond traditional ideas and strategies.

Finally, in contrast to most other decision categories, failure to provide orders to the platoon as expected was predicted by accurate knowledge of who has the advantage in the situation and what friendly positions are exposed to enemy fire (Level 2), as well as inaccurate knowledge of those not in communication (Level 1). It appears leaders with better higher-level

SA are also better at providing complete and accurate orders to their own platoon. The difference in the direction of the finding here could also be a difference in the type of decision. Here, the Platoon Leader is giving orders and recommending action, not merely seeking or relaying information to others. These findings bear more investigation, but indicate intriguing possibilities regarding how Platoon Leaders link their SA to their behaviors in complex battlefield situations. It also indicates key areas where training is needed to improve communications and information flow in Infantry operations.

Survey of Key SA Skills

For this task, a survey was developed and distributed to both commissioned and non-commissioned officers who spent a significant portion of their time training Platoon Leaders. Sixty surveys were distributed and 43 surveys were returned, for a very high 71.6% response rate. The rank of respondents ranged from Corporal to Colonel. Most were highly experienced, with 72% reporting more than 12 years of active duty service. Most also reported the Platoon Leaders they trained were relatively inexperienced, with either less than 12 months of experience (36%), or between 12 and 24 months of experience (51.5%).

Survey respondents were asked to identify, for each activity included in the survey, whether it (1) was not a major SA problem for new Platoon Leaders, (2) caused moderate SA problems for new leaders, or (3) caused frequent SA problems for new Platoon Leaders. Items were divided into four sections, three corresponding to the levels of SA (perception, comprehension and projection) and the fourth comprised of more general performance factors. Items identified by more than 25% of respondents as problematic are shown in Table 2. Four of these items were identified by more than 40% of all respondents as causing frequent SA problems for new Platoon Leaders: (1) failure to gather/detect the critical information in the situation due to not communicating key information to other platoons, (2) failure to detect critical information in the situation due to not determining the opposing forces' location of direct/indirect fire support, (3) failure to gather/detect the critical information in the situation due to not determining the location of the opposing forces' heavy weapons, and (4) failure to effectively perform the necessary mission tasks due to poor time management. For the complete results see Strater, Jones and Endsley (2001). Only those items identified as most critical and as promising targets for training effects are described here.

The results shown in Table 2 provide a clear indication of two major Level 1 SA problem areas for new Platoon Leaders. Of the nine communication items on the survey, eight (89%) were considered a major problem for SA by over 25% of survey respondents. Communication was, therefore, identified as a key area for SA training intervention. The second Level 1 SA problem area was in gathering information on the combat readiness status of the opposing force, with 11 items rated by more than 25% of respondents as causing frequent problems. This difficulty carries over into higher levels of SA, as failure to understand the implications of information about the enemy is indicated as a major problem for Level 2 SA also. Additionally, instructors rated understanding enemy strengths and weaknesses, likely areas of strategic significance to the enemy, and enemy expectations of friendly actions as major problem areas for

SA. At the projection level, trainers noted that new Platoon Leaders have difficulty projecting a likely enemy course of action (COA), as well as their disposition around heavy weapons. This supports the findings of Strater, et al. (2000) that less experienced officers tend to focus more on friendly troops than enemy troops, although the survey indicates that this is a problem across all three levels of SA.

Table 2. Survey items receiving the highest rating of “Frequent SA problems for new Platoon Leaders” from more than 25% of survey respondents

Question	% of Responses
Failure to Correctly Gather/Detect the Critical Information in the Situation Due to: (Level 1)	
Not utilizing a standard reporting procedure	30
Not carrying out standard operating procedure	28
Not detecting information due to attentional narrowing	27
Poor intelligence information due to:	
• Not requesting pertinent intelligence	31
• Not employing squads tactically to gather needed information	30
• Not determining reliability/timeliness of intelligence information	26
Poor communication caused by:	
• Not communicating key information to other platoons	44
• Not communicating key information to commander	35
• Not requesting information from squad leaders	30
• Not requesting information from commander	30
• Not communicating key information to squad leaders	30
• Not monitoring company net	28
• Not communicating overall situation/Commander’s Intent to squads	28
Not determining own combat readiness status:	
• Timing/location of direct/indirect fire support	30
• Experience and training	26
Not determining combat readiness status of opposing force:	
• Location of direct/indirect fire support	44
• Heavy weapons location	40
• Number and severity of casualties	37
• Availability of reinforcements	37
• Weapons types, characteristics and quantities available	33
• Ammo and supplies availability	33
• Physical fatigue	30
• Mental fatigue	31
• Movement and current position of troops	28
• Past behavior and tactics	26
• Impact of current and future weather factors	26
Failure to Comprehend the Situation (even though basic information is detected) due to: (Level 2)	
Not specifying alternate/supplemental plans/courses of action	32
Not assembling bits of information together to form a coherent picture	29
Not developing an understanding of:	
• Enemy expectations of friendly actions	34
• Task priorities	33
• Impact of Soldier load and distance traveled on troop fatigue	33
• Enemy strengths and weaknesses	29
• Likely areas of strategic significance to enemy	27

• Positioning Soldiers to minimize the risk of fratricide	25
Failure to Project the Future Situation (though current situation is understood) due to: (Level 3)	
Lack of contingency planning	39
Failure to project the following:	
• Usage rate of ammunition and supplies	36
• Likely enemy COA from available information	33
• Location of enemy troops around heavy weapons	32
Failure to Effectively Perform the Necessary Mission Tasks Due to: (Performance)	
Poor time management	45
Poor responses to unexpected/unplanned events	36
Poor task prioritization	28
Poor mission planning	27

In addition to these two areas, several other specific items were identified as major problem areas for SA where targeted training could produce improvements in SA. Of all the items on the survey, time management was found to be the most problematic. Along with this, task prioritization was indicated as a major SA problem for new leaders in terms of both understanding what task priorities should be and performance. Attentional narrowing, focusing on one aspect of the environment or piece of information to the detriment of others, was another frequent problem, as were not assembling bits of information together into a coherent picture, not specifying alternate COAs, and poor contingency planning. Due to the dearth of solid information on SA issues in these domains, these results provide a key foundation for directing SA training initiatives. It points clearly to several areas where training intervention strategies could be useful for bolstering SA in Platoon Leaders.

Identify Best Strategies for Training SA in Infantry Operations

In order to select SA training strategies having the highest probabilities of success, we began by investigating models of Infantry SA to identify leverage point for training. Endsley, Holder, Leibrecht, Garland, Wampler and Matthews (2000) developed an Infantry-focused model of Situation Awareness that provides great utility in targeting areas to impact Soldier SA (Figure 1). In the model, the warfighter gains information from the external world via several methods: user-interface displays of data from electronic systems, from other individuals, and from direct observation. In return, SA influences these system inputs by directing attention to cues believed to be significant based on the individual's internal model of the relevant operating world. Expectations, goals and objectives shape the individual's SA by influencing the perception, comprehension, and projection of information. This information, such as enemy and friendly intentions, actions and status, weapons available, weather and terrain, are then incorporated into the individual's mental representation of the environment, his SA. The challenges of task and environmental factors such as battle tempo, fatigue, and physical and mental condition also influence the Soldier's SA.

Fundamental to the acquisition of SA are an array of individual factors. In training, it is the individual factors that are modified, the means by which the various other inputs to the

system are shaped by the individual's abilities, experience and expectations. Situation awareness training strives to modify these initial individual factors and, thus, to enhance the information processing capabilities of the Soldier by providing experiences and opportunities for the development of a richer understanding of the combat environment. Thus, training SA should be directed at increasing the rate at which an individual Soldier's abilities, experience and expectations develop. Key skill target areas identified by the model include communications, team processes, environmental scan patterns and knowledge of system operations. Key mechanisms identified in the model to increase SA include pattern matching to schema and mental models for the higher levels of SA, development of automaticity in physical skills and effective use of goal-directed processing. The model also incorporates higher-level meta-cognitive skills involving the development of accurate expectations (through pre-mission planning), contingency planning and self-checking. These cognitive coping mechanisms ease the cognitive demands on the system, enabling the individual to handle the information overload through processes like automaticity and pattern matching. They are an excellent leverage point for training SA.

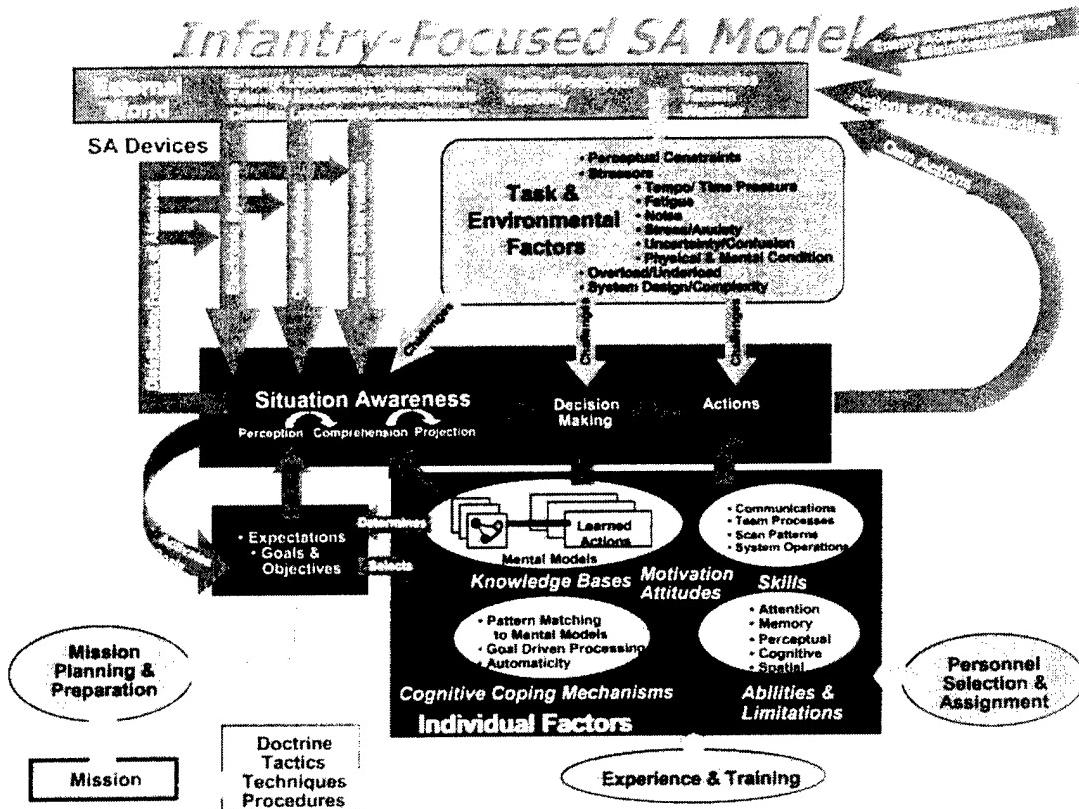


Figure 1. Model of Infantry SA (From Endsley, et. al. 2000)

In addition to the model, SA training should incorporate the results of existing research on SA. Much of the available research on SA has been conducted in the aviation arena. While the SA requirements of a pilot who relies heavily on cockpit instrumentation for information vary greatly from the SA requirements of an Infantry Platoon Leader, it is plausible that many of

the general findings will have validity in both situations. Our literature review identified six general principles believed to be highly relevant in the Infantry domain (Strater et al., 2001).

Principle 1: Emphasis on planning & preparation

Pre-mission planning provides a critical framework for SA, creating expectations to which future events and environmental features are matched (Endsley, 1995). Prince and Salas (1998) found that experienced pilots completed more thorough pre-flight preparation than less experienced pilots. In a study of battlefield planners, expert battlefield planners did not develop their plans more quickly than novices, but rather investigated the situation carefully, seeking more information prior to developing their plans. Geiwitz (1994) found that even when officers know their Commander's Intent two levels up, it rarely factors in to their planning process, indicating that training could be targeted to improve the planning process of even experienced officers. Improvements in the planning process could then be expected to produce not only enhanced SA, but also better decision making.

Principle 2: Focus on higher levels of SA

Some studies have shown that experts and novices may focus the majority of their attention on different levels of SA. For example, experts attend more to context (Level 2) while novices concentrate on surface cues (Federico, 1995). Experts look at the cues within the context of the situation to infer meaning from the sum total, while novices attempt to infer meaning from cues somewhat independent of context. Similarly, one study of decision making found that while novices focused on the Level 1 SA details, such as enemy equipment, experts focused on the big picture, the comprehension and projection elements of SA (Klein & Calderwood, 1996). In a study of decision making in armored units, Brezovic, Klein, & Thordsen (1987) found that students in an armored officer basic course noticed the same cues as the instructors training the course, but were unable to draw accurate inferences from the cues. The ability to interpret and understand what the cues in the environment mean is a vital skill not only in the development of higher-level SA, but also in guiding decision making and action.

Principle 3: Thorough information gathering

Orasanu and Fischer (1997) found that better performing flight crews spent more time gathering information to aid in decision making, while poorer performing crews quickly moved to option comparisons. Cohen, Thompson, Adelman, Bresnick, and Riedel (1999) found that experts spend more time verifying their findings than novices, who are more likely to make decisions based on initial information. The ability to monitor assumptions and identify errors is a key skill in maintaining high levels of SA.

Principle 4: Task management & prioritization

Interruptions, task-related distractions, other distractions and overall workload pose a high threat to SA. Good task management strategies appear critical for dealing with these problems. Schutte and Trujillo (1996) found that the best performing teams in non-normal situations were those whose task management strategies employed a prioritization strategy based on the perceived criticality of the tasks and situations. Those who used an event/interrupt driven strategy (dealing with each interruption as it came up) and those who used a procedural-based strategy performed more poorly. The ability to accurately assess the importance and severity of

events and tasks is an important component of Level 2 SA. This understanding allows individuals to actively manage their task and information flow so as not to end up in situations in which they are overloaded, potentially missing critical information.

Principle 5: Contingency planning

Contingency planning has been noted as a critical skill that can lead to high levels of SA (Endsley, 1988, 1995). Amalberti and Deblon (1992) found that a significant portion of experienced pilots' time was spent in anticipating possible future occurrences. This gives them the knowledge and time necessary to decide on the most favorable COA to meet their objectives. Experienced pilots also appear to spend significant time in pre-flight planning and data gathering and in active contingency planning in flight (Serfaty, Macmillan, Entin, & Entin, 1997). Each of these actions serves to reduce workload in critical events. Using projection skills (Level 3 SA), these pilots are able to actively seek important information in advance of a known immediate need for it and thus plan for various contingencies. A recent study of Infantry rifle teams found that teams rarely deviated from the original plan, despite cues indicating that such deviations would be advisable (Sampson, Statkus, & Woods, 2003). The pace of combat demands rapid decision making, and deviations from a plan require time-consuming delays while options are considered and new plans are made. By planning in advance for contingencies, these delays can be reduced and contra-indications to the plan can rapidly be assimilated into a new COA.

Principle 6: Compare and contrast patterns

Although experts are able to perform pattern matching to situations previously encountered, they rarely rely on simple pattern matching, but rather use it as a tool to guide their understanding of the situation. Experts look at a situation to determine how it differs from a mental model or a pattern previously encountered. Calderwood, Crandall, and Baynes (1988) found that once experts have generated a COA, they look for information that contraindicates their COA, while novices seek information that confirms their COA as the best choice. Thus, experts have a propensity to play devil's advocate with their plans, looking for holes that the enemy might exploit, while novices search for endorsement for their plans. While pattern matching provides the opportunity to more quickly understand a situation, matching information to the wrong pattern can lead to a false understanding of the situation that can be difficult to correct. In one study, after researchers intentionally introduced incorrect information to induce application of an erroneous model, conflicting information was presented (Jones, 1997). Only 35% of these conflicting cues resulted in detection of the false model. This has a serious implication for training to improve higher level of SA. Optimizing SA training, then, should not only include opportunities to develop exposure to patterns of action and behavior, but should also intentionally vary the patterns presented to Soldiers so they will have the opportunity to identify critical cues in each situation.

In addition, it is important to investigate research on the implementation of training programs and apply the lessons learned here, also. Ross, Pierce and Baehr (1999) investigated fire support training and found that simply introducing new technologies into existing curricula was not sufficient to improve training. Learning is facilitated through realistic experiences where trainees are required to solve inherently intriguing problems. The Soldier must be cognitively immersed in the challenge of the scenario for true learning to occur. Other

investigations of training techniques have found that Soldiers best learn practical thinking skills either individually or in small groups (Fallesen, 1995), that tactical decision making is improved through building experience and that mental agility, the ability to think on one's feet, is developed through exposure to multiple and varied scenarios (Livsey, 1993). Training methods were selected, therefore, to incorporate realistic, interesting scenarios, with compelling problems to be solved by the Soldier.

The Infantry warfighter faces incredible challenges in attaining superior SA. The operational environment is often harsh and always variable, with extremes of hot, cold, rain and drought, information quantity and quality is often insufficient for the demands of the mission, the enemy is highly motivated, intelligent, and employing deception, operational tempo can rapidly change from nothing happening to bullets flying, and the Soldier's role can shift in an instant from peacekeeper to warfighter. In this demanding Infantry combat environment, enhancing SA will yield dividends by providing information dominance, improving security and survivability, reducing fratricide, and optimizing lethality. With the application of enhanced information technologies, training must focus on techniques to improve the warfighters' ability to identify and assess the significant cues from competing and even conflicting information sources. By applying knowledge acquired from sound research that promotes better understanding of the factors influencing Infantry SA, we greatly enhance our ability to develop training programs that will positively impact Soldier SA.

SA and Cognitive Skills Measurement

A measurement tool is needed to assess SA and related cognitive skills in the course of validating SA training programs. The Infantry Platoon Leader version of SAGAT (Strater, Endsley, Pleban and Matthews, 2000) was identified as appropriate for this effort. It provides an objective measure for directly assessing the impact of proposed training programs on their recipients. More subjective measures could also be in conjunction with SAGAT, such as the Situation Awareness Behaviorally Anchored Rating Scale (SABARS), where an observer rates the behaviors necessary for the Platoon Leader to both acquire and disseminate information, as well as subjective self-ratings scales, such as the Mission Awareness Rating Scale (MARS) developed for use in Infantry field testing (Matthews, Beal, & Pleban, 2002).

Training Tool Development

The objective of this research effort was to develop and validate training tools for enhancing SA in Infantry Platoon Leaders. While these tools are expected to be applicable to a much wider range of Army warfighters and officers, Infantry Platoon Leaders were selected as the initial target population for this research. This focus was selected because, (a) Infantry Platoon Leaders are front line officers with a direct impact on the operations of each fighting unit, (b) Infantry Platoon Leaders are often the least experienced officers leading Soldiers in the field, and thus are at most risk for low SA as a result of cognitive overload, and (c) improvement in SA among this group is likely to have large trickle-up effects on the SA of officers at higher

echelons. If ISAT can be shown to lead to better SA in this target group, future work can be directed towards expanding ISAT to address specific SA issues for other echelons and other Army specialization areas.

Based on earlier research results, current efforts for improving SA in Infantry Platoon Leaders were targeted at improving 1) task planning and time management, 2) communications in three directions (up to the Platoon Leader's CO and higher, downward within the platoon, and laterally to adjacent units), 3) contingency planning, and 4) development of missions schema. The first module developed was the time management and task prioritization module, called the SA Planner, while the second module, called the SA Trainer, is a Schema trainer, which incorporates communications training and contingency planning into the program. ISAT was developed in keeping with principles for adult learning (Reigeluth, 1983), focusing on high levels of interaction and participation. Each exercise begins by presenting the Platoon Leader with an operational order (OPORD), along with necessary graphical control measures. The Platoon Leader then performs the specific tasks outlined in the exercise, and receives points for his performance as he moves through the scenario. This allows participants to learn the identified skills and knowledge interactively, receiving instructional feedback and opportunities for experiential learning. Each module will be described in more detail later.

Sharable Content Object Reference Model (SCORM) Issues

We developed the concepts for the SA Trainer and SA Planner with the intention of writing the programs in Visual Basic, which would create an installable, stand-alone program. Though we never intended to develop web-based training, we considered making our software SCORM compliant, in agreement with current trends in US Army training software development (Dodds, 2001). SCORM requires that content be separated from context specific runtime constraints, be web based, and be reusable and interoperable. Thus, lesson content is completely separate and distinct from the programming that controls data collection, lesson presentation, screen sequencing, and student information. These latter issues must be kept separate from content and managed by a Learning Management System (LMS). The LMS manages data by storing instructional management information in XML documents.

As our training software development progressed, several issues arose in regards to the SCORM requirements. Content was developed for the SA Planner, a far less complex program than the SA Trainer, and work was begun on a LMS that would manage the content. Then content development began on the SA Trainer, which brought out several issues to be solved in developing SCORM-compliant web-based training. The first problematic issue identified was the method of delivery. The SA Trainer makes extensive use of audio, video and still image cues. These are all large files, especially the video cues, and create bandwidth issues when the program is delivered via the web. Due to the high bandwidth required to deliver the SA Trainer via the web, it was decided that a CD based delivery would be more appropriate, especially in light of the need to develop a program that could be accessed from a wide range of PCs running a variety of operating systems, with highly varied technical specifications.

In addition, with a limited budget for software development, it was not feasible to develop a complete, comprehensive LMS that could manage the large amount of data collection and sequencing issues that would arise in managing the SA Trainer. The cost of developing such a LMS could well have exceeded the original budget for this entire research project. As an alternative, a search was conducted to find an existing LMS that could be licensed for use in our product. At that time, extensive investigation uncovered no available SCORM-compliant LMS that could be licensed and used for CD-based training delivery. Additionally, were such a product available, it would likely have been cost prohibitive within our program budget. Typically, licenses for a LMS will cover only a limited number of students before additional costs are incurred, and a license that would only allow the SA Trainer to be used for a few students was not deemed adequate for the demands of the program.

The final issue deals with data collection and student performance tracking. SCORM requires that a specific data model be used. The data model allowed within SCORM permits only a minimum, maximum, or total score to be passed from the content and recorded by the LMS. This would not allow for the recording of SAGAT information, or other useful data that provides important feedback for the participant on performance. While the issue of allowable scores could have been worked into the program, the other issues described made an attempt to develop a SCORM-compliant program infeasible.

For these reasons, we decided the program would function better, and more scenarios could be developed, if attempts to comply with SCORM requirements were abandoned. Because this decision was reached halfway through the term of the project, we continued developing our software in HTML, DHTML, JavaScript, Cascading Style Sheets and Active X control formats to store user data.

From our experience, several recommendations can be made concerning application of these SCORM requirements to military training programs. When developing web-based applications, bandwidth issues can rapidly become overwhelming. While these issues can be overcome, it is necessary to understand that such programs can only be effectively run on systems with high-speed Internet connections, a severe limiting factor for Army personnel in some locations. Also, with the expense of licensing existing LMS systems, and the cost of developing new LMS systems, it would be highly cost-effective for the Army to develop a versatile, functional LMS for use in all applications meant to be SCORM compliant. While such a development would not be inexpensive, it is far more cost effective than paying for a separate system for every training module developed. Finally, such a program should incorporate some kind of functionality for providing feedback that is more informative than just a minimum and maximum score. Training technology has developed to the point where we understand the value of providing relevant information that goes beyond the scope of a score and pinpoints specific target areas for improvement. A LMS with this kind of functionality would be of tremendous benefit in the development of future training programs.

SA Planner

The first area targeted for improving SA in Infantry operations was the need for better skills in assessing the time requirements and prioritization for different tasks. As SA is very dynamic in nature, timing and prioritization of events and tasks are essential elements of comprehension and projection, the highest levels of SA. Many SA problems can occur if individuals are unable to properly prioritize tasks based on events and determine the timing requirements associated with them (e.g. "how much time do I have until my troops will be in place?" "How long will it take to distribute ammunition?" "Which tasks can I accomplish in the allotted time period and which tasks are most important in this situation?") To address these issues, we developed the SA Planner.

The objective of the SA Planner is to assist Platoon Leaders in developing time management and task prioritization skills that are important for higher levels of SA. The SA Planner employs interactive scenarios as a fundamental training approach for improved learning and retention of information. Upon receipt of a five-paragraph Company OPORD with associated graphics, the Platoon Leader is first asked to identify the tasks necessary for mission completion by checking boxes in a task list (see Figure 2).

The screenshot shows a software window titled "SA Planner". At the top, there are tabs for "OPORD" and "GRAPHICS", and buttons for "EXIT" and "CONTINUE". Below the tabs, a message reads: "Please check each task that must be completed during this mission:". A large list of tasks follows, each preceded by a checkbox:

<input checked="" type="checkbox"/> Accountability of Troops	<input type="checkbox"/> Area/Zone Reconnaissance
<input type="checkbox"/> Assault a Building	<input checked="" type="checkbox"/> Attend Initial Mission Briefing
<input checked="" type="checkbox"/> Breach an Obstacle	<input checked="" type="checkbox"/> Chow
<input type="checkbox"/> Clear a Trench Line	<input type="checkbox"/> Clear to the Objective
<input checked="" type="checkbox"/> Commo Checks	<input type="checkbox"/> Conduct a Defense
<input checked="" type="checkbox"/> Conduct a Deliberate Attack	<input checked="" type="checkbox"/> Conduct a Leader's Recon
<input checked="" type="checkbox"/> Conduct a Link-Up	<input type="checkbox"/> Conduct a Raid
<input checked="" type="checkbox"/> Conduct a Rehearsal	<input type="checkbox"/> Conduct an Ambush
<input checked="" type="checkbox"/> Conduct Analysis Based on METT-TC	<input type="checkbox"/> Conduct Presence Patrol(s)
<input checked="" type="checkbox"/> Conduct Security Patrol(s)	<input checked="" type="checkbox"/> Consolidate and Reorganize
<input type="checkbox"/> Construct an Observation Post (OP)	<input type="checkbox"/> Construct Defensive Position(s)
<input type="checkbox"/> Cross a Water Obstacle	<input checked="" type="checkbox"/> Designate Rally Points
<input type="checkbox"/> Electronic Warfare Environment	<input type="checkbox"/> Employ Protective Obstacle(s)
<input type="checkbox"/> Establish a Checkpoint	<input type="checkbox"/> Establish an Observation Post (OP)
<input type="checkbox"/> Establish Blocking Position	<input checked="" type="checkbox"/> Establish Sectors of Fire
<input checked="" type="checkbox"/> Establish Security at Breach Site	<input checked="" type="checkbox"/> Handle Enemy Prisoners of War (EPWs)
<input checked="" type="checkbox"/> Infiltrate for Mission	<input checked="" type="checkbox"/> Inspect Troops
<input checked="" type="checkbox"/> Issue Ammo	<input checked="" type="checkbox"/> Issue FRAGOs

Figure 2. SA Planner: Identify the tasks for the mission

Planning for an Infantry mission is a structured process that is done in a series of procedural steps. Many later tasks build upon the information identified in earlier tasks, so task order is an important consideration. For those planning tasks that should be done in a specific order, the Platoon Leader is asked to place the mission planning tasks in order (see Figure 3). After the Platoon Leader identifies all the necessary mission tasks and selects Continue, the program analyzes the results and provides feedback on tasks that should have been included and were not, as well as on tasks that should not have been selected, yet were.

The screenshot shows a window titled "SA PLANNER RESOURCES ASSISTED THE PLATOON". At the top left are buttons for "OPORD" and "GRAPHICS". At the top right are buttons for "EXIT" and "CONTINUE". Below the title, a instruction reads: "Please number these tasks in the order (1 - 14) in which they should be completed:". A list of 14 tasks is provided, each preceded by a numbered box for input. To the right of the list is a vertical box containing a subset of these tasks, likely representing a recommended or correct sequence.

Task Number	Description
8	Address actions on chance contact
1	Attend initial mission briefing
3	Conduct analysis based on METT-TC
4	Conduct map recon
5	Coordinate company plan with platoon plan
6	Develop and issue a reconnaissance and surveillance (R&S) plan
7	Develop control measures
8	Finalize plan
9	Issue platoon order
10	Issue WARNO to platoon
11	Make necessary changes in plan
12	Plan & coordinate CSS
13	Plan fire support
14	Task-organize the platoon as required

Attend initial mission briefing
 Issue WARNO to platoon
 Conduct analysis based on METT-TC
 Conduct map recon
 Plan fire support
 Plan & coordinate CSS
 Develop control measures
 Address actions on chance contact

Figure 3. SA Planner: Place the planning tasks in order

Next, the Platoon Leader is asked to estimate the time required to perform each planning task given mission time parameters, and to select the most appropriate personnel to perform each task (see Figure 4). Personnel assignments are checked as they are entered, so error messages are given as soon as the selection is made. The Platoon Leader cannot continue until a new personnel assignment is made and accepted by the program. Task time, however, is checked when the Platoon Leader is satisfied with all his responses and selects Continue. At this point, correct answers to the time required for the tasks are given in an acceptable range. Incorrect answers must be changed before the Platoon Leader can continue to the next screen. In some cases, if a perfect score is attained on the first try, a code will be provided which can be used to skip that screen in subsequent scenarios. Once all answers are correct, the Platoon Leader gets a message that says, "FRAGO, your mission time has been moved up." The Platoon Leader then has to re-estimate time on these tasks based on the shorter planning cycle. This process, while redundant, should help Platoon Leaders better learn how to use the available time to the best advantage.

In the next screen, the Platoon Leader must identify those tasks that are critical to mission success, as shown in Figure 5. Critical tasks include only those tasks that are necessary for mission success. For example, if you are to assault and secure an airfield that is surrounded by

EXIT

Please indicate in minutes how much time each of these planning tasks will take and who will perform each task. Items in red will affect the mission clock, items in black can be performed at the same time as other tasks & will not change the mission clock.

You have 12 hours to plan and prepare for your mission.

60	PL	<input checked="" type="checkbox"/> Attend initial mission briefing
15	PL	<input checked="" type="checkbox"/> Issue WARNO to platoon
10	PL PS, SQL	<input checked="" type="checkbox"/> Conduct analysis based on METT-TC
10	PL PS, SQL	<input checked="" type="checkbox"/> Conduct map recon
25	PL PS, SQL	<input checked="" type="checkbox"/> Plan fire support
10	PL PS, SQL	<input checked="" type="checkbox"/> Plan & coordinate CSS
10	PL PS, SQL	<input checked="" type="checkbox"/> Develop control measures
10	PL PS, SQL	<input checked="" type="checkbox"/> Address actions on chance contact
10	PL PS, SQL	<input checked="" type="checkbox"/> Task-organize the platoon as required
10	PL PS, SQL	<input checked="" type="checkbox"/> Develop and issue a reconnaissance and surveillance (R&S) plan
10	PL PS, SQL	<input checked="" type="checkbox"/> Finalize plan
25	PL	<input checked="" type="checkbox"/> Coordinate company plan with platoon plan
10	PL PS, SQL	<input checked="" type="checkbox"/> Make any necessary changes in plan
50	PL	<input checked="" type="checkbox"/> Issue platoon order
40	All	<input checked="" type="checkbox"/> Chow
30	SQL	<input checked="" type="checkbox"/> Issue Squad OPORD
60	SQL TL	<input checked="" type="checkbox"/> Issue weapons (sensitive items)

Time Remaining:
215 Minutes

Figure 4. SA Planner: Indicate the time and personnel for each task

concertina wire, you must breech the wire fence around the airfield. Without performing this task and moving onto the airfield, you cannot secure it. Many other tasks that should be performed may not be critical to the success of your mission, such as tactical movement. While it is wise to move tactically, the mission can theoretically succeed if you do not.

The final screen, shown in Figure 6, asks the Platoon Leader to estimate task times during the execution phase of the mission. Again, correct times are assessed based on a time range. While we recognize that anything can happen in an Infantry mission and any task could take significantly longer than expected, we are not looking for a worst or best case scenario here, but rather trying to train the Platoon Leader to adequately plan events. Time should be assigned based on how long a task would reasonably be expected to take, rather than on either an overly pessimistic or optimistic estimate.

SCENARIO: PDRK Resecure Airfield 1st Platoon

EXIT CONTINUE

Please check the tasks that are critical to the execution phase of this mission:

<input type="checkbox"/> Infiltrate for mission	<input type="checkbox"/> Occupy an assembly area
<input type="checkbox"/> Accountability of troops	<input type="checkbox"/> React to snipers
<input type="checkbox"/> Tactical movement	<input type="checkbox"/> Conduct a leader's reconnaissance
<input type="checkbox"/> Prepare for attack	<input type="checkbox"/> Secure a route
<input type="checkbox"/> Breach an obstacle (wire around the airfield)	<input type="checkbox"/> Maintain security at breach site
<input type="checkbox"/> Issue FRAGOs	<input type="checkbox"/> Conduct a deliberate attack
<input type="checkbox"/> Handle EPWs	<input type="checkbox"/> Consolidate and reorganize
<input type="checkbox"/> Report tactical information	<input type="checkbox"/> Treat and evacuate casualties
<input type="checkbox"/> Secure civilians during operations	<input type="checkbox"/> Process captured documents/equipment
<input type="checkbox"/> Conduct a security patrol	<input type="checkbox"/> Conduct a link-up
<input type="checkbox"/> Prepare for follow-on missions	

Figure 5. SA Planner: Identify the critical mission tasks

SCENARIO: PDRK Resecure Airfield 1st Platoon

OPORD GRAPHICS EXIT CONTINUE

You are now executing your mission. Please indicate in minutes how much time each task will take:

:0 Assemble in assembly area	Mission Time: 45
:0 Accountability for personnel	
:0 React to snipers	
:0 Tactical movement	
:0 Conduct a leader's reconnaissance	
:0 Prepare for attack	
:0 Secure a route	
:0 Breach the wire obstacle around the airfield	
:0 Issue FRAGOs	
:0 Execute the attack	
:0 Handle enemy prisoners of war	
:0 Consolidate and reorganize	
:0 Report tactical information	
:0 Treat and evacuate casualties	
:0 Secure Civilians during operations	
:0 Process captured documents and equipment	
:0 Conduct a Security Patrol	
:0 Conduct a link-up	

Hours to Minutes Calculator
Calculate

Figure 6. SA Planner: Identify the time for these mission execution tasks

As the Platoon Leader works through the scenarios presented in the SA Planner, he encounters a wide range of situations and situational factors that are important for building robust schemata associated with the time estimation and prioritization elements of SA. A

concise User's Manual for both training modules is provided on the SA Trainer CD and in Appendix A of this report.

SA TRAINER

One of the most important factors underlying the development of good SA is the presence of mental models and schemata of prototypical situations (Endsley, 1988, 1995). These schemata provide the background through which warfighters are able to rapidly organize and interpret the vast amounts of information encountered. They provide a crucial mental construct framing how individuals direct their attention and they trigger activation of latent knowledge when critical situational cues change. Schemata also allow warfighters to differentiate between what is important and what is not.

Novice Platoon Leaders suffer greatly from not having these mental models or schemata. They are quickly overwhelmed by information, are slow to grasp what information is important, and are unlikely to look for important follow-up information. Experienced Platoon Leaders can do this almost automatically. These schemata form one of the most important knowledge base foundations that allow for high levels of SA in demanding combat environments.

Unfortunately, to date, developing these schemata has required trial and error experience in either actual combat situations or field training exercises. As the opportunities for elaborate field training are limited, most Soldiers have few opportunities to develop robust mental models of either combat or peacekeeping operations. It can take many years and many field exercises to develop robust mental models of how the combat world works (including friendly and enemy operations) with a full repertoire of important schemata for recognizing and classifying prototypical states of that world. We developed the SA Trainer to address this need. The concept behind this program is to create a PC-based training module to supplement existing training methods and allow warfighters to develop better mental models and schemata that can further develop and enrich their field-based exercises and actual combat experience. This training program cannot replace field training, but may provide cognitive coping mechanisms to enhance the training value provided by the field exercises.

The SA Trainer provides a framework to help Soldiers develop schemata that are important for attaining good situation awareness, including knowledge of important cues, comprehension of their significance and projection of future status. The SA Trainer allows the Soldier, in a scenario-based computer program, to deploy troops inside his area of operations (AO) as the scenario unfolds. A total of three scenarios have been developed for the SA Trainer. Each scenario is introduced with a five-paragraph Company OPORD, followed by relevant graphics that include a map of the Company AO with mission graphics, a terrain map without the mission graphics, and an overview map showing the surrounding area. After the maps have been reviewed, the Platoon Leader views a brief summation that provides the commander's intent (CI) and rules of engagement (ROE). The OPORD, mission graphics, and CI/ROE for each of the three scenarios are shown in Appendix B.

As in a real mission, the Soldier can access this information throughout the scenario, and intelligence updates are provided on occasion, but reconnaissance by platoon elements should uncover the majority of additional information critical to the development of leader SA. By deploying troops to a given area, the leader will be able to find information that is only available in that location. This helps to develop information-gathering strategies and skills as well as an understanding of the importance of utilizing one's human resources. When an event is triggered, the Platoon Leader selects actions from a menu. In a typical event, the actions available are to attempt capture, attempt kill, question, detain, search, release, communicate (further options on a communications menu are to send Contact or Situation Reports (SITREP) and to relay information to higher headquarters, adjacent platoons, or squads). As in real life, the actions selected consume time on the mission clock, another valuable resource that the Platoon Leader must learn to manage. Our scenarios are essentially self-paced and self-directed, allowing exploratory learning by the participant. Critical cues are provided through Soldier reports, civilian queries, and through graphical pop-ups that provide photo or video representations of the critical cues (e.g., cigarette butts and trampled grass). A sample screen shot from the SA Trainer is shown in Figure 7.

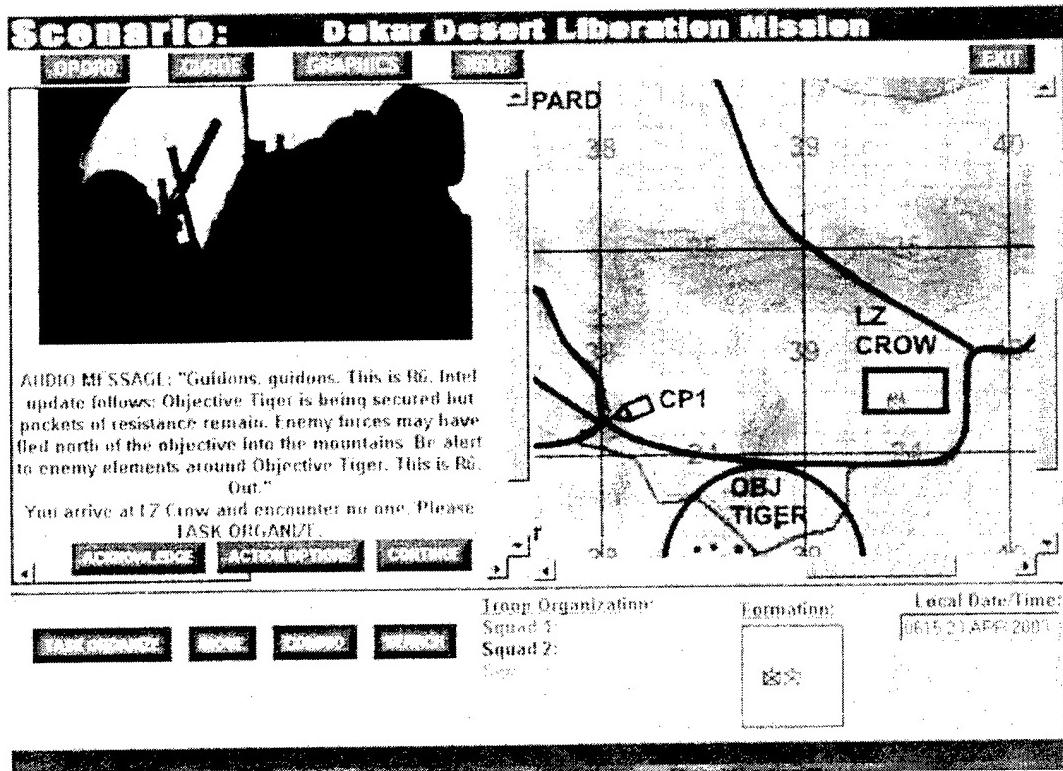


Figure 7. SA Trainer: Sample program screen

SA Trainer scenarios are designed to be sufficiently complex that they can be repeated for additional training benefit. By working through these scenarios several times, the Soldier can learn from prior mistakes, identify the important cues and understand what they mean. This repeated exposure provides a framework for the development of schemata, which enable Soldiers

to rapidly organize and interpret the large quantity of information they receive and gather to form the higher levels of SA — comprehension and projection. In general, later scenarios are more complex than earlier scenarios, with multiple endings depending upon the actions and options selected by the Platoon Leader. If the Platoon Leader chooses to perform an action that results in a mission failure, he will be instructed to consider what he did wrong and attempt the mission again.

The purpose of the SA Trainer is train the Platoon Leader to develop his SA across all three levels. To this end, we introduce the concept of SA in terms that are relevant to the Platoon Leader. The SA Trainer instructs the Platoon Leader to think of the three levels of SA in terms of

- ***What?*** – what did I see, hear, etc,
- ***So What?*** – what does it mean for my mission, and
- ***Now What?*** – what does this information tell me about what might happen next?

These terms are used frequently throughout the program to reinforce any training effects and to discipline the Soldier to consider all three levels of SA at all times. In addition, the SA Trainer introduces an instructional character, known as the SA Ranger, who gives tips and feedback to the Soldier working through the scenarios. Sometimes this feedback is related to the actions chosen, while other times it is not. SA Ranger messages range from brief reminders, such as “Why aren’t you keeping your CO in the loop?” (if the Soldier fails to relay significant information to superiors), to tips on general points to consider, such as the need for security on the landing zone (LZ). Because the purpose of the program is to provide training, direct answers to most questions are not provided. Rather, the program seeks to assist the Soldier in developing a mindset to question and critically evaluate the information received. A sample screen showing the SA Ranger and an accompanying message is shown in Figure 8.

In addition to this experiential learning, at periodic intervals the training scenario is interrupted and SAGAT (Endsley, 1988, 1995) is administered. SAGAT queries require the Platoon Leader to report current SA (e.g. perception of where different elements are located, locations of friendly and enemy strengths and weaknesses, anticipated civilian actions), as shown in Figure 9. The SA Trainer then compares the Soldier’s answers to what is really happening in the scenario and tailored feedback is provided on the accuracy of his perceptions. Because these scenarios are designed to be repeated for additional training benefits, Soldiers are not actually given the correct answers, nor is feedback given on the accuracy of responses to specific queries. Rather, at the end of the SAGAT halt, the Platoon Leader is told what percentage of questions he answered correctly. In addition, due to multiple branches within the program, not all items are scored every time. This serves to make it more difficult for the Soldier to determine precisely which queries were answered correctly. Generally, when someone is tested on what they know, they are tested on how well they understand the information they have been given. An important concept in understanding these SAGAT queries is that we are not concerned solely with the information available to the Soldier. The Soldier will be tested on information that may be impossible for him to know with certainty, because it may not have been provided (e.g., location of enemy base camp). When we administer SAGAT, we are testing SA. Often, in combat, a

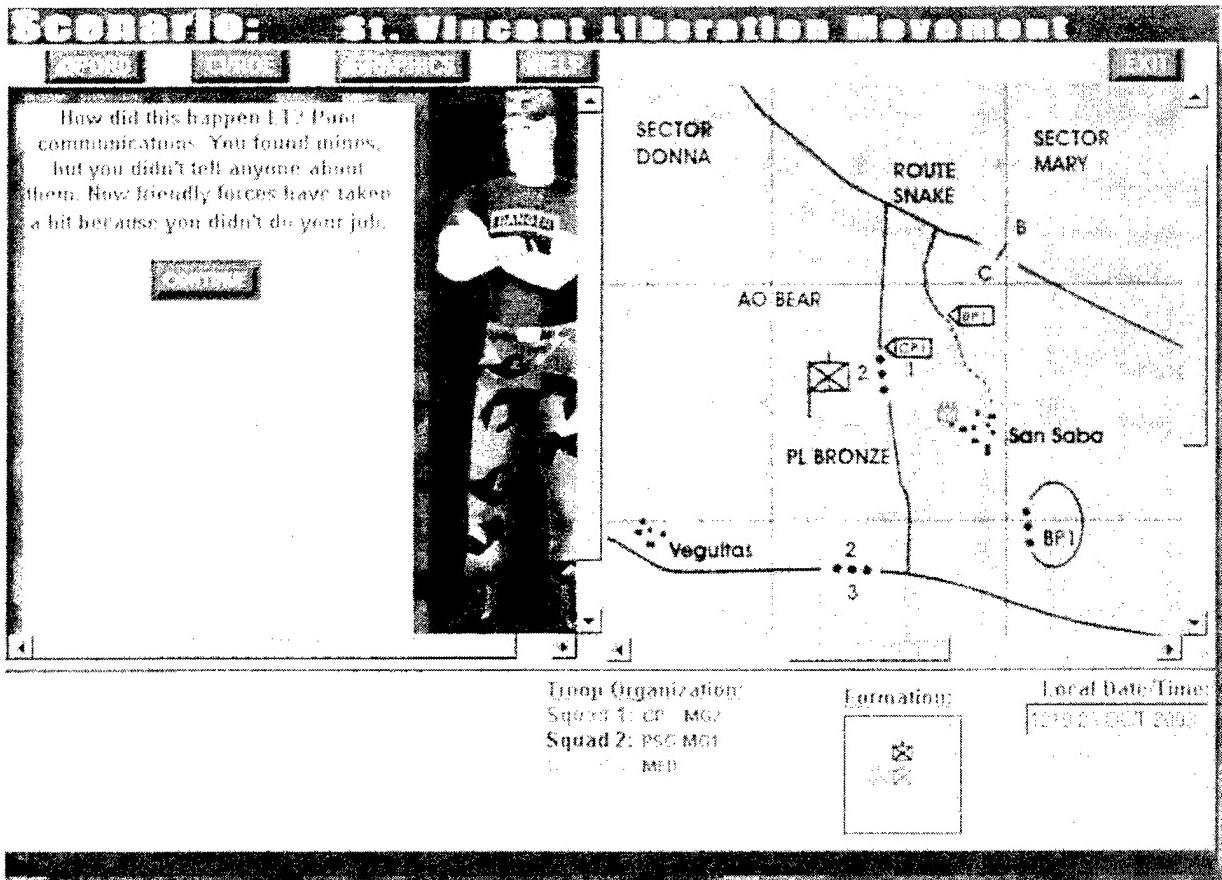
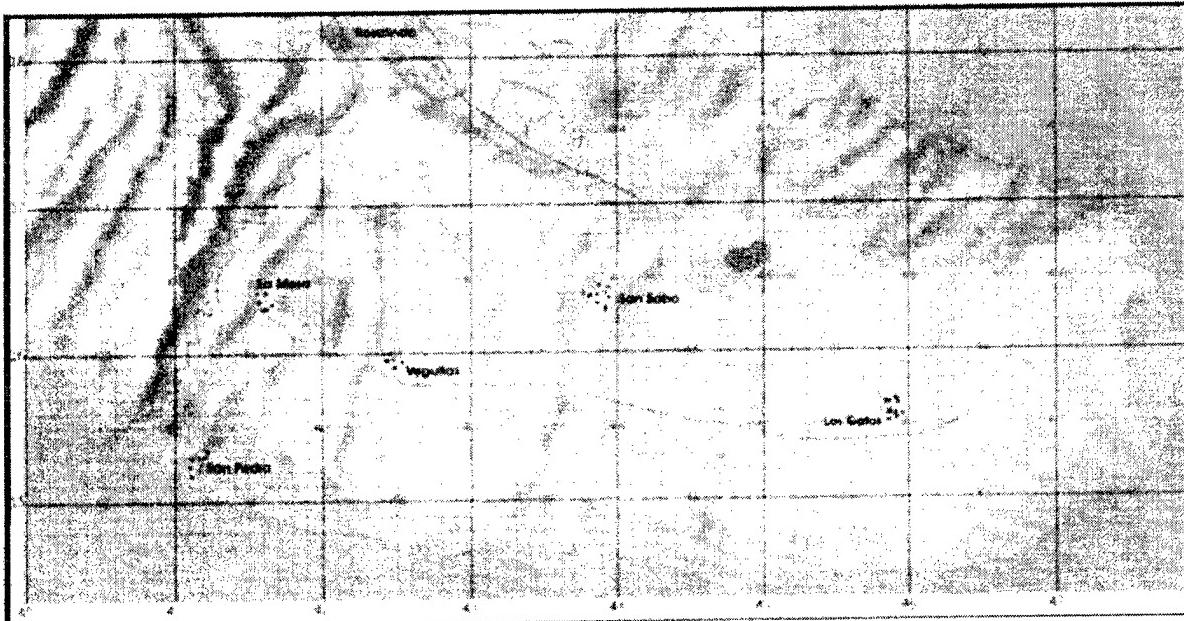


Figure 8. SA Trainer: SA Ranger feedback and tips

warfighter will lack critical information about enemy plans and actions. In other words, SAGAT seeks to assess the warfighter's knowledge of ground truth, and not simply the warfighter's knowledge of the information received. At the end of each trial, the Platoon Leader is given a percentage correct score as an assessment of the accuracy of his SA at that time. As there is generally some information that the Platoon Leader has not been given and thus cannot know, these scores are not typically very high, nor is there a benchmark for passing the assessment. The objective, rather, would be to improve SA scores in subsequent scenarios, or on subsequent trials of the same scenario.



1) Identify the location (both known and suspected) of your platoon, other friendly forces, enemies and civilians on the map: (click on the symbol, then click on the map to place.)

Own Platoon:	Other Friendlies:	Enemies:	Civilians:
P1	CCF	E3	C1 C4
		E1 E4	C2 C5
P3		E2 E5	C3 C6

CONTINUE

Figure 9. SA Trainer: Sample SAGAT screen

At the end of each SAGAT halt, the SA Ranger appears again, providing feedback on what is happening and what the Soldier should be considering. Inside this feedback screen are bulleted points reminding the Soldier of some of the things he has seen or been told. He is reminded that these things are not fact, however, but bits of information that he must evaluate. These bulleted points are tailored to those specific items the Soldier has encountered in the scenario. A sample screen of this SA Ranger post-SAGAT feedback is shown in Figure 10. Using this form of structured feedback, participants should be able to better interpret and utilize the cues they receive. Feedback is essential to learning; yet, we felt it was important to allow participants to repeat the scenarios for additional training benefit. By combining a direct measure of SA (SAGAT scores) with the indirect feedback of the bulleted list, we are able to balance these competing needs. The SAGAT scores will indicate improvement in SA with experience, while the SA Ranger feedback provides instruction on how to think about the situation to aid in the development of SA. This dual approach should help Platoon Leaders develop the essential schema and mental models that are needed to improve SA, particularly at the level of comprehension and projection.

Intel from the SA Ranger

Ok, LT. Mateo is on his way into AO Panther, and it's your job to secure the AO before he arrives. What? So What? and Now What? are taking on a whole new meaning with the leader of this country entering your AO.

WHAT info have you obtained? You have been told the following:

- SLIM is infiltrating local villages to create unrest.
- SLIM have RPGs and trucks for mobility.
- San Saba is excited about Mateo's visit, but some in Las Gatos hate Mateo.
- SLIM is interested in Mateo's movements and security.
- Anti armor mines are placed in the road to San Saba.

SO WHAT does all this mean? What does this tell you about the following?

- SLIM plans to disrupt Mateo's visit
- Local support for Mateo
- SLIM COAs (Courses of Action)

How reliable is your information? Where did it come from? Does it all agree, or does the information conflict?

NOW WHAT will happen next? And how will you prepare and react to it?

- What is the worst thing that the enemy could do?
- What is the most likely COA for the enemy?
- Is your plan flexible enough to react to any threat to your mission?

What, So What and Now What will help you prepare for whatever happens. Take the time to consider all your options.



Figure 10. SA Trainer: Sample post-SAGAT SA Ranger feedback

Earlier research identified communications problems as a significant issue underlying poor SA in inexperienced Platoon Leaders. Because a large portion of SA information comes across communication channels (either direct verbal, non-verbal or radio communications), the SA Trainer also targets communications as a key skill. Most communication training programs focus on communication protocols and syntax, which are certainly important. The focus for improving communication to enhance SA is slightly different, and complementary to those efforts. The SA Trainer embeds communication training into the scenarios, by providing positive consequences for good communication, negative consequences for poor communication, along with SA Ranger reminders and feedback concerning both. Often the problem is not that the individual does not know how to communicate (i.e., knowledge of the proper reporting protocol), but rather that he does not always consider the benefits to communicating or requesting certain information (e.g., "I didn't realize they needed to know that," "I didn't know that was important", or "I didn't think to ask that"). Information that is known to the Platoon Leader but not passed along cannot be used by others to effect positive outcomes. The SA Trainer incorporates essential training on recognizing and communicating key information to the appropriate personnel.

In addition, contingency planning has been identified as a key skill area required for good SA and decision making. It is a skill clearly linked to Level 3 SA (projection of the future).

Good warfighters are able to use low-workload periods to anticipate and plan for contingencies, allowing them to be proactive rather than reactive if those future events occur (Amalberti and Deblon, 1992, Endsley, 1993, 1995). Contingency planning greatly contributes to high levels of SA projection (the highest level of SA) and the ability to quickly detect and comprehend events. Those who do not actively engage in contingency planning are far more likely to be overloaded by events in high-workload periods. While some experienced officers and Soldiers have learned to do this naturally, many do not actively employ this skill. Earlier research identified this as an area in which inexperienced Platoon Leaders have significant shortcomings. By training Platoon Leaders in the importance of contingency plans, the SA Trainer seeks to increase their frequency of contingency planning and situation projection. At intervals throughout each scenario, the SA Ranger appears and asks the Platoon Leader to develop contingency plans. In addition, when conflicting information is received, the Platoon Leader may be asked to consider the information and determine how it will impact his mission. The SA Ranger reminds the Platoon Leader to consider what he should do if information A is correct, and what he should do if information B is correct. By working through many scenarios, each laced with unexpected events, participants can develop knowledge bases critical for projecting possible future occurrences, as well as developing contingency planning skills and behaviors that are very important for good SA.

As stated previously, the main purpose of the SA Trainer is to provide experiential exposure to a variety of scenarios, to allow the Platoon Leader to gain experience in detecting significant cues and in identifying prototypical situations. While allowing the Platoon Leader to focus on these goals, training on contingency planning and communication skills are introduced gradually, with little emphasis in Scenario 1, more emphasis in Scenario 2, and heavy emphasis in Scenario 3.

ISAT Validation

Although two training modules were developed for this program, validation testing was only done on the SA Trainer. The SA Planner is similar in format to other training programs that have been used to train a specific skill set. However, the SA Trainer is a unique concept in training, so we believed it would be more productive to focus our validation efforts on the SA Trainer. Validation took place in two phases. Initial testing focused on usability and functionality, while subsequent field testing focused on identifying training effects.

Usability testing

A researcher initially went to the U.S. Military Academy at West Point, where 3 officers (1 Lieutenant Colonel and 2 Majors) and 2 senior cadets assisted in preliminary usability and functionality testing of the SA Trainer, each spending between an hour and an hour and a half with the program. Testing was done in three groups. Participants were given a five-minute introduction to the background and objectives of the ISAT program and the SA Trainer, along

with limited instruction on how to move through the scenario. After this, participants were left to work with the program without instruction. The researcher unobtrusively observed their interaction with the program, noting their actions and responses. Participants were told to ask questions if they did not understand how to perform a desired action or if an option was unclear to them. Questions were written down, along with information on times when the participant selected an option, then exited without performing an action. Participants were asked whether the labels on the buttons were clear, and whether the actions performed by the buttons matched what they expected from the label. At the end of their trial, participants were asked to rate the SA Trainer on ease of use, how interesting and informative it was, and how useful they felt it would be for both a new Platoon Leader and for themselves. Items were rated on a five-point scale with 1 indicating "Not at all," 3 indicating "Somewhat," and 5 indicating "Very." Individual ratings for each question, along with question means are shown in Table 3, while the percentage of responses at each numerical level are shown in Figure 11.

Table 3. SA Trainer Usability Evaluation Data

Rank	Cadet	Cadet	LTC	Major	Major	MEAN
How useful did you find the training module for your level of experience?	4	4	3	2	2	3
How useful did you feel the training module would be for a new Platoon Leader?	4	4	4	3	4	3.8
How interesting did you find the training module?	4	5	4	3	3	3.8
Overall, how informative was the training module?	4	3	3	3	4	3.4
Overall, how easy was the training module to use?	2	3	3	1	3	2.4

Lowest ratings, with a mean of only 2.4, were given for the question "How easy was the training module to use?" Participants indicated that movement was difficult for them (users must specify a direction and distance they want the platoon to move), and that they would prefer to drag and drop the platoon marker in the desired location. However, because events are triggered by passing through the individual grid squares, drag and drop movement is not feasible. Just as in a mission, you cannot teleport from one location to another, but rather must pass through terrain on the way between two points. In the SA Trainer, users encounter situational items as they move through different grid squares. With drag and drop movement, trainees could move through only the tiniest corner of a grid square, which would necessitate decisions about how close they actually came to each situational item, what the item was, and whether they were close enough to trigger the item. The algorithms required to compute this with drag and drop movement were beyond the scope of the program. Participants also indicated they were frustrated by the number of steps necessary to acknowledge a message, because the program forced them to acknowledge incoming messages before taking any other action. This complaint was addressed by placing the Acknowledge Message button at the bottom of the screen, so it is immediately available when a message appears. Also, participants wanted to be able to select several actions at once. We altered the program so that they could select several communication items at once (i.e., relay message to platoon sergeant and squad leaders, relay message to adjacent platoons, and send SITREP). However, the sequential nature of other actions dictates

that they be selected individually. For instance, if you see a civilian and select "Kill" then select "Question", the dead civilian will be unable to respond. For many items, the order in which you select the various actions determines the results provided. Some participants also wanted the opportunity to actually "fight" their platoon in combat, while other participants didn't feel that was important for this trainer. While there is tremendous training utility in a program that would allow the participant to maneuver squads independently, such a program would have been tremendously complex both to develop and to evaluate and provide feedback on participant performance, and was deemed beyond the scope of this project.

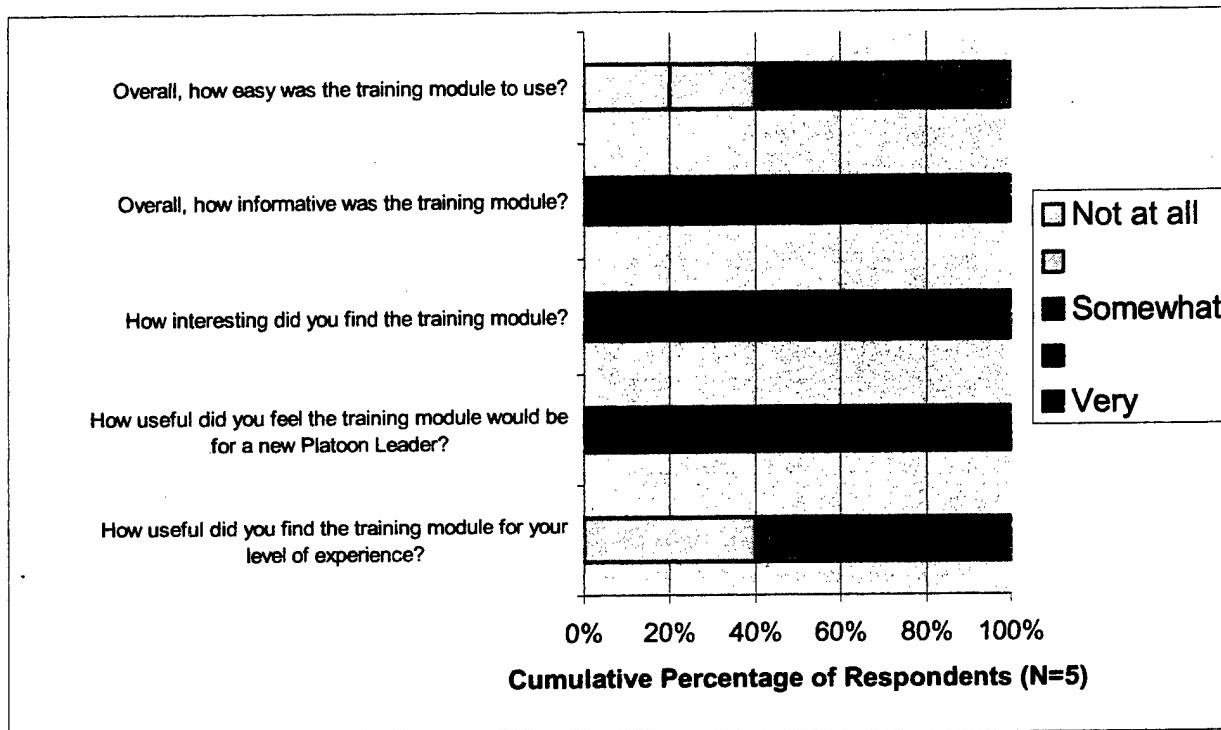


Figure 11. Percentage of ratings for each value for SA Trainer Evaluations

In addition to these ratings, participants were asked to write comments and suggestions for the researchers on their evaluation forms. These comments have been reproduced in Table 4, along with notes about actions taken, or not taken, in regard to the suggestions. Finally, it is important to note that this evaluation only covered the first scenario, the least complex of the three scenarios developed.

Changes made to the SA Trainer after the usability testing resulted in a program that is easier to use. No program crashes occurred during the usability testing; an important finding since the CDs were to be sent to Norway for the field tests, where technical support options were limited.

Table 4. Written comments on SA Trainer Evaluations

Rank	How can the module be improved? Can we add any additional information?	Suggestion Implemented?
Cadet	Incorporate drag and drop movement	No- Items encountered as you move through terrain, drag and drop does not support this.
	Use interactive map for movement	No - see above
Cadet	More in depth	Yes - subsequent scenarios are more complex. However, subject wanted a more comprehensive training tool- teach everything a PL needs to know. This program is targeted at improving SA.
	This was good for entry-level training, but need more depth for anyone with experience leading a platoon.	
	The interface is difficult to work with	
	The program scolds you for not performing functions the program does not allow you to do.	Yes - The number of messages related to actions the user cannot perform in the program has been reduced, and the phrasing was changed
Lt Col	Help me "see" better, I didn't have 3-D on the screen	No - No 3D graphics available. Printed copies of the maps are included in the User Guide
	Nice integration of Radio messages	
Maj	Make clear that the participant won't actually be fighting their platoons.	Yes - Message included in Help
	There are some things a PL would have access to at all times that were unwieldy to get to or unavailable, ex graphics, maps, OPORD	Yes - PL can access maps and OPORD during the mission
	"Your" suggestions about how do I ID a landing zone were on the money, but given the tools available, could not be performed.	Yes - The number of messages related to actions the user cannot perform in the program has been reduced, and the phrasing was changed
	This is a very passive process, I have to wait to be "fed" bits of info, in a real situation I'd be able to reach out and touch people to get the info I need rather than wait for info to wander around the wilderness waiting for stuff to happen	No - Some information can be requested, but you must go out and find information yourself.
Maj	Menu bar can be easier to use by allowing multiple decisions at one time (e.g. Acknowledge report and relay at the same time)	Yes - Acknowledge message button is easier to access, and you can relay reports to multiple people at once.

Field Testing

Field testing of the SA Trainer took place in Norway between May 23 and June 21, 2003. Cadets from both the Royal Norwegian Naval Academy and the Royal Norwegian Army Academy participated in separate field training exercises during this time period. The Naval Academy exercises commenced on May 23rd and concluded on May 29th, while the Army exercises commenced on June 6th and concluded on June 20th. Our field testing involved collaboration between researchers from the U.S. Military Academy and SA Technologies, as well as researchers and military personnel from both the Royal Norwegian Naval Academy and the Royal Norwegian Army Academy. Researchers from SA Technologies and the U.S. Military Academy traveled to Norway in March of 2003 to conduct task analyses for the purpose of developing and refining measures suitable for the field testing, and to coordinate with researchers and officers from the Norwegian academies, and then returned in May and June to participate in the field exercises.

Cadets from both academies received the training CDs and subsequently participated in separate one (Navy) or two (Army) week training exercises, which employ combat fatigue training procedures, including minimal rest (1-2 hours of rest per day), limited food intake, and highly stressful situations. However, incorporating research protocols into field exercises was a new development for the Army Academy, and this resulted in several procedural inconsistencies that made their results difficult to interpret. For instance, no SA Trainer evaluation forms were received from Army Academy cadets. Thus, we do not know how much SA training they actually received. Additionally, officers from the Army Academy informed us that some cadets in the training group never received training CDs. Therefore, because of the difficulty in determining which army cadets actually utilized the training CDs, only results from the Naval Academy cadets are reported.

Method

Participants

Eighty cadets from the Royal Norwegian Naval Academy participated in field testing. Unlike the U.S. system, cadets in Norwegian military academies are generally experienced personnel with prior military service. While the Naval Academy cadets were experienced naval personnel, they were not generally experienced in Infantry operations. In the training exercises selected for testing, however, they functioned as Infantry warfighters.

Prior to the field training, cadets were divided into four platoons subdivided into ten assigned squads. Two platoons were comprised of two squads, and two platoons were comprised of three squads. Once cadets were assigned to squads, half the squads were randomly selected to receive the training CDs. Thus, 40 cadets from the Royal Norwegian Naval Academy received SA Trainer CDs. Trained cadets were slightly older than untrained cadets, with a mean age of 26.1 years versus 25 years. Trained cadets also had a higher mean number of deployments, with 2.6, than did untrained cadets, with 1.5.

Materials and Procedure

Approximately two to three weeks prior to the field exercises, half of the cadets scheduled to participate in the combat fatigue exercises were provided with CD copies of the SA Trainer containing two of the training scenarios. User Manuals were distributed with the CDs, and included a special introduction page, instructing the cadets to complete each training scenario at least once prior to the start of the exercises, but adding that additional training value could be gained by repeating the scenarios multiple times. Only two scenarios were complete at the time of the testing, and both scenarios were included on each CD. A mechanism was built in to the program to allow the trainee to easily email their results, including the elapsed mission time, to researchers at SA Technologies. However, the mechanism was apparently not compatible with the email system in use at the Norwegian academies, so few results were emailed, and those that were sent were garbled and thus not useful, except to indicate that the cadet was using the training program. One cadet sent five garbled messages, another sent two, and three additional cadets sent one email each. Because of the small number of emails sent, and concerns that the timing of the exercises would not allow cadets adequate training time to use the SA Trainer (field exercises began the day after final exams concluded), researchers at the Royal Norwegian Naval Academy scheduled a two-hour group training session immediately prior to the commencement of the exercises. Thirty-nine of the trainees met in a computer lab at the academy and spent one hour and fifty minutes independently going through the training scenarios. One trainee dropped out prior to field exercises and is not included in any analyses. The final 10 minutes of the training period was reserved for the trainees to complete evaluation forms similar to those used for the earlier usability testing at West Point. The SA Trainer Evaluation forms used are shown in Appendix C.

On completion of the training session, cadets assembled to begin the combat fatigue exercises. In these exercises, cadets were allowed only very limited sleep and food and placed under tremendous stress, for the purpose of discovering hidden reserves and abilities. The exercises began Friday afternoon with a two to three day march to the camp location (Camp Ulven, Norway), from which the cadets embarked upon a series of missions within the context of a multinational effort to eliminate guerilla forces from an allied country. In the scenario selected for study, Norwegian naval cadets were assigned the task of a coordinated assault to eliminate two suspected Special Forces camps from a nearby peninsula. Each day, this mission was assigned to a different platoon. As mentioned earlier, there were a total of four platoons, two with two squads, and two with three squads. On the days when a three-squad platoon assaulted the camps, the three assigned squads were combined into two assaulting squads, with each squad responsible for the elimination of one of the two camps. Thus, there were ten assigned squads, but only eight assaulting squads. In addition, because the cadets chose how to divide the squads, two of the eight assaulting squads had a mixture of trained and untrained squad members, creating some difficulty in data analysis. Throughout the remainder of this report, squads will be referred to as either assigned squads (10) or assaulting squads (8).

In order to accomplish their mission, cadets first rowed two to four hours in small boats to a landing area on the peninsula. They then maneuvered to the location of the suspected enemy Special Forces camps. Although their instructions were to eliminate all Special Forces in the area and take no prisoners, the people at the camps were actually Norwegian Coastal Rangers,

playing the part of civilian refugees. They had several tents set up in each camp, clothes hung on trees, and cooking fires were lit. When the assaulting squads arrived in the area, the "refugees" were cooking, talking, laughing, and listening to music on the radio. In short, there were numerous indications that this was not a Special Forces camp, as Special Forces would generally behave in a more covert and tactical manner. It seemed like an excellent test of SA to determine whether the cadets would correctly identify the camp as something other than a Special Forces camp. The attacks on the two camps were coordinated to occur simultaneously. After the camps were either entered or assaulted, both assaulting squads gathered with instructors for a debrief and AAR.

Personal Digital Assistant (PDA, i.e. Palm M100 handheld organizers) versions of SAGAT were developed for use in the field tests, however, the night before testing began, academy researchers realized there was no opportunity to provide training to the cadets on use of the PDAs. Without training, they felt the cadets would be too fatigued to use the unfamiliar PDAs during the exercises. As a last-minute alternative, paper and pencil versions of SAGAT were developed. However, by switching to paper and pencil measures, we were restricted to collecting SAGAT data only two times during the exercise, once near the beginning and again at the end. The two SAGAT forms administered are shown in Appendix C.

To supplement the SAGAT data, we made a last-minute decision to utilize a novel query technique. Two researchers posed as embedded reporters and traveled with the two squads conducting the mission each day. "Reporters" asked questions found on the SAGAT forms, such as "What is your mission?" and "What is your current grid location?" While this was an interesting technique that holds some promise for future research, its unsystematic application and the limited availability of correct answers made scoring the data problematic. For example, the addition of a GPS device to record the correct grid location would have assisted greatly in analyzing this data.

On completion of the exercises, cadets were assembled for debriefing and After Action Review (AAR) of the mission. Prior to the debrief and AAR, each cadet completed three forms, the final SAGAT mentioned earlier, a Mission Awareness Rating Scale (MARS), and a form developed by a researcher at the naval academy (not analyzed here). MARS contains 8 questions that provide a subjective self-evaluation of Level 1, 2, and 3 SA, knowledge of how to achieve mission goals, as well as the mental effort required to acquire each level of SA and determine how to meet mission goals (Matthews et al., 2002). To complete the SAGAT queries, cadets were asked to think back to what they knew earlier, just before they either assaulted or entered the refugee camp. In addition, an Observer/Controller (O/C) who accompanied the squad during the mission completed a Situation Awareness Behaviorally Anchored Rating Scale (SABARS) form for the squad leader, evaluating those behaviors which prior research has linked to the acquisition of SA. The MARS and SABARS forms can also be found in Appendix C. The exercise ended when all forms were collected and the debrief concluded.

Results

Usability

Figure 13 shows the percentage of cadets agreeing with each statement on the SA trainer Evaluation form with ratings at each numerical level, where 1 indicates they agree “Not at all,” 3 indicates they agree “Somewhat,” and 5 indicates “Very.” Mean time spent with the training program was 2.7 hours, with cadets reporting between 20 minutes and 8 hours of training time. Only five cadets reported spending more than 4 hours on the SA Trainer. Cadets also reported that they practiced the training module an average of 1.8 times. Because of language differences, however, it is unclear whether they were reporting the number of times they went through a single scenario, or the number of times they went through both scenarios. The range on this was from 0 to 6 times through the training module. Cadet comments were also recorded, however, they tended to be somewhat obscure. Several cadets referred to bugs in the program, without specifying what problems they encountered. Another common complaint was that the OPORDS contained too much information and required too much reading. Since this was not mentioned by any of the U.S. Soldiers in the earlier usability testing, it is believed to be the result of differences in the expectations and procedures of United States warfighters and Norwegian warfighters.

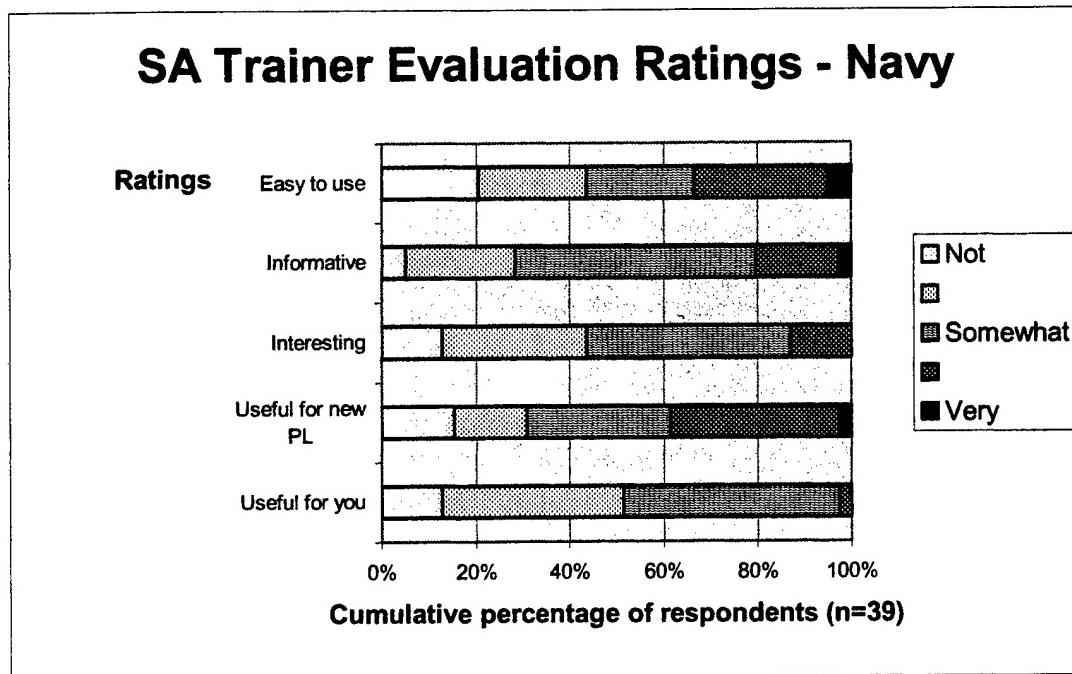


Figure 12. SA Trainer evaluations from Norwegian Navy cadets

SAGAT

SAGAT data were collected on the last three of the four days for this mission, from seven of the ten assigned squads, due to the kind of mix-up that occasionally occurs in field exercises.

Embarrassingly, the forms were locked inside a rental car that day, along with the keys to the car. In addition, some cadets were unable to complete the training, and some SAGAT forms were not completed. In summary, SAGAT data was collected from only 50 of the 80 cadets beginning the study, including only 28 cadets of the 40 in the SA training group. The reduced sample size reduced the statistical power of our analyses. In addition, fatigue also affected the O/Cs, so some SAGAT queries could not be scored because the correct answers were not provided. Some items were scored the same for every squad, such as next enemy action and number of enemies within 500 meters, while others were squad-specific, such as current location and distance to the objective. Squad-specific data could only be scored if the O/Cs provided correct answers. Because of the relatively small sample size, squad-specific queries were not scored if more than 2 assaulting squad O/Cs did not provide correct responses for the queries. Scored queries are bolded in Appendix C. So, from the original set of SAGAT queries, only 7 were scored in this analysis.

Differences between the trained and untrained group were found on four of seven scored queries. Those which were significant or approached significance are shown in Table 6. First, untrained cadets performed better at identifying their current, six-digit grid location. It should be noted that only five cadets answered this question correctly, all were untrained, and four were from the same assaulting squad, which could indicate it was something they had recently discussed. Also, untrained cadets were better at identifying the number of enemy Soldiers within 500 meters of their location. Note that in this scenario, the correct number was always zero. There were no enemy Soldiers present in the scenario. Third, trained cadets were better than untrained cadets at identifying their mission, but this was the question that everyone found easiest to answer correctly. Finally, trained cadets were better at predicting what the enemy would do next. Because there were no enemy forces in the scenario, the correct answer to this question was "Nothing."

Table 5. ANOVA and means for selected SAGAT queries

SAGAT Query	Mean percent correct			
	F	p	Trained	Untrained
What is your current grid location?	8.700	0.005	0.000	0.187
How many enemy are within 500 m of your location?	4.110	0.048	0.108	0.299
What is your mission?	2.931	0.093	0.785	0.711
What will the enemy do next?	2.719	0.105	0.406	0.224

*Note: N = 50

SABARS

SABARS data was not analyzed as we were unable to accurately link the data to the individual assaulting squad leader in all cases. Repeated attempts to identify the assaulting squad leaders, or at least identify which leaders were trained and which were not, has resulted in a list of 10 assigned squad leaders. However, on the two days when a platoon of three squads conducted this mission, the three squads were divided into only two assaulting squads for the

mission. On these days, it was unclear which assigned squad leaders led the assault on the two camps.

MARS

MARS data was analyzed to identify whether any differences existed between the trained and untrained cadets on their ratings of their SA and the mental effort required to develop SA. While no significant differences were found between trained and untrained cadets ratings of the quality of their SA, differences were found between their ratings of the effort required to attain SA. Statistically significant differences are shown in Table 6. Trained cadets reported significantly more cognitive effort was required to develop Level 3 SA, predicting what would occur next. Specifically, trained cadets reported a mean effort required of 3.25 (where 4 is very difficult and 1 is very easy) while the mean rating for untrained cadets was 2.33. In addition, trained cadets also indicated that they expended significantly more mental effort to determine how best to achieve their mission goals during the exercise, with a mean rating of 2.75, compared to 2.5 for untrained cadets. These results suggest the SA training alerted trainees to the necessity to expend mental energy in these areas.

Table 6. ANOVA and means for selected MARS items

			Mean values	
	F	p	Trained	Untrained
Difficulty (mental effort) predicting what will occur next	9.047	0.004	3.250	2.333
Difficulty (mental effort) deciding how best to achieve mission goals	5.622	0.021	2.750	2.500

*Note: N = 70.

Performance

Few true performance measures were actually collected during the study. Of the eight assaulting squads performing the mission, only two correctly chose not to assault the refugee camps. One of the two assaulting squads was entirely composed of cadets who had received the SA training, while the other assaulting squad was a mixed squad with both trained and untrained cadets. The squad leader of the mixed assaulting squad, however, had received the SA training. Thus, trained cadets led both of the successful assaulting squads. While this was an interesting and promising finding, it is not statistically significant by t-test ($p=.23$). Although these exercises have been conducted in prior years, to date, we have been unable to ascertain how many squads correctly chose not to assault the refugee camp in prior years' exercises. It is not unlikely that one or two squads refuse to assault the camp each year.

Another measure of performance was the number of rounds fired. Table 7 shows the number of rounds reported fired by each assigned squad, as well as the number of squad members reporting. There were many missing data points for this item, where cadets did not report the number of rounds fired. For assigned squads that did not assault the camp (Squads 1 and 5 - trained, and Squad 10 – not trained), no rounds were fired, so null reports from those

squad members were corrected to 0, while for other squads, null reports were omitted from analysis. Mean number of rounds fired by trained cadets was 6.371, while untrained cadets fired an average of 9.273 rounds. There was tremendous inter-squad variability, with one squad that assaulted the camp reporting only 10 rounds fired, while another reported 235. Due to the large variance in number of rounds fired, Analysis of Variance (ANOVA) showed this difference was not statistically significant (see Table 8). The assaults, when they occurred, could clearly be heard by one researcher stationed in the headquarters (HQ), and that researcher believed many rounds were fired in each assault.

Discussion

The acquisition of superior SA is a complicated process for Infantry Warfighters. Initial intelligence, as well as intelligence updates from a variety of sources, must be integrated with information obtained from direct observation. To impact this information acquisition and integration process, the trainee will need to commit time and effort to the training program. Cadets in this study spent an average of only 2.7 hours using the SA Trainer prior to testing. Although this result was not surprising given the timing of the exercises, which began the day after final exams for a highly motivated group of students, they are lower than we hoped to see. 2.7 hours is a relatively small amount of training time to produce the desired benefits.

Table 7. Field Exercises: Number of rounds fired by assigned squad

Squad	No. of cadets in Squad	No. of cadets reporting rounds fired *	Trained?	Assaulted Camp?	Rounds fired	Mean rounds fired*
1	8	6 (8)	Y	N	0	0.000
3	8	6	Y	Y	98	16.333
5	8	7 (8)	Y	N	0	0.000
7	7	7	Y	Y	80	11.429
9	8	6	Y	Y	50	8.333
2	8	5	N	Y	30	6.000
4	8	8	N	Y	235	29.000
6	8	5	N	Y	10	2.000
8	8	7	N	Y	31	4.429
10	8	7 (8)	N	N	0	0.000

*Note: Null reports from cadets in squads that did not assault were corrected to 0 rounds fired. Other null reports were omitted from analysis.

Table 8. ANOVA and means for number of rounds fired

			Mean values	
			F	p
			Trained	Untrained
Number of rounds fired			.763	0.386
			6.371	9.273

*Note: N = 68

Overall, there were some tentative indications of training effects. ISAT trained cadets led the two assaulting squads that successfully refused to assault the refugee camps, however, no historical data is available to indicate the number of squads that would typically refuse to assault the camps. For several reasons, though, this was not an ideal test of SA. First, tremendous pressure was placed on the cadets to assault the camps, even when they reported to their CO that there were indications these were not Special Forces camps. In a brief review of some of the interview videotape from one trial, researchers counted over 10 occurrences when the CO encouraged the assaulting squad leader to attack over the radio, using phrases like "Attack now, attack, attack, attack, now, now, now!" "All our intelligence indicates that these are Special Forces camps," and "You are endangering the other squad with your delay!" Although the videotape does not pick up all of this interaction, questioning by the "embedded reporter" after one successful trial revealed that the assaulting squad leader refused to obey an order to open fire on the camp. While this does illustrate that this exercise is not a simple evaluation of SA, it might be accurate to state that it provides an indication of the cadets' confidence in their SA. In order to resist the pressure exerted by the CO, the cadet must have a higher degree of confidence in his or her judgment than would otherwise be required. If a few hours with a computer-based training program can provide trainees with the confidence to act upon their SA, that is a strong indication that this program could serve an important function in producing Soldiers with improved SA. Thus, even if historical data were available on the number of squads refusing to assault the refugee camp, it would be difficult to draw firm conclusions because of the significant impact of the individual playing the role of the CO.

It was also interesting that trained cadets fired fewer rounds at the refugee camp. There was some question about the accuracy of reporting on this question, as the number of rounds reported fired does not match up with one researcher's memory of the sound of the assault. Despite concerns about reporting accuracy, it is a positive indication that trained cadets fired fewer rounds at a misidentified refugee camp.

The mixed SAGAT results, where some questions were more accurately answered by untrained cadets while trained cadets more accurately answered others, could merely be a product of the limited sample size. Objective measures need a larger N to gain statistical power. Indications of any kind of training effect should be taken as a positive sign in light of the small sample. In addition, some items could not be scored, because the O/C assigned to the group failed to record a correct answer. Some items were scored the same for every squad, such as next enemy action and number of enemies within 500 meters, while others were squad-specific, such as current location and distance to the objective.

MARS data may provide the strongest support for indications of a training effect. ISAT trained cadets reported more difficulty in predicting what was going to occur. They realized that they needed to expend cognitive energy to predict what might happen next. In combat, the Soldier should assume the opponent is a clever, thinking enemy, actively seeking to employ deception. One cannot anticipate his actions without dedicating some cognitive resources to the task. Similarly, ISAT-trained cadets indicated they had to expend more mental effort determining how to best achieve their goals during the mission. These findings tie in with the purpose behind the schema trainer, of teaching Platoon Leaders to think about SA and to focus

on the necessary steps to developing SA in the field. Interestingly, this mental effort is seemingly independent of the results it produces. Although trained cadets reported that they had to work harder to gain Level 3 SA and to determine how to best achieve their goals, they did not indicate a corresponding increase in the quality of their SA. While the desire behind any training program is to reduce the amount of time and effort expended in performing a task, we must also realize that just over 2 ½ hours of training time is grossly insufficient for the development of the robust schemata and mental models necessary for the development of automaticity. If this amount of training can produce greater efforts on the part of the trainees to consider the implications of information they have received, it demonstrates that computer-based training programs can be used as a tool to enhance development of the skills necessary to gain and maintain the higher levels of SA.

Conclusions and Recommendations

In conclusion, trained cadets seemed more likely to have the confidence to act on their SA and to trust their judgment and analysis of the situation enough to make decisions, even when unsupported by their CO. While it would not be desirable to have junior officers refusing to obey orders on a regular basis, it is desirable to have the person in the field, with eyes on the objective, make important judgments about the situation, and have the confidence and authority to act on that judgment. Often this confidence to act independently is missing in junior officers. Overconfidence, though, is a dangerous characteristic in an unpredictable Infantry environment. It is interesting that the higher confidence apparently demonstrated by trained cadets' willingness to resist orders to attack while developing a superior understanding of the situation are not related to increased self-assessments of SA as reported on the MARS scale. While it seems intuitively true that higher confidence in SA would also result in higher self-evaluations of SA, this is not borne out in the current investigation. By teaching Platoon Leaders to critically evaluate their SA, to think about future enemy action in terms of the most likely scenario as well as the most dangerous scenario, the SA Trainer allows the Platoon Leader to develop confidence based on careful, critical analysis of the information available. This process is always likely to produce superior SA, especially at the vital higher levels of comprehension and projection that can be so difficult for inexperienced officers to develop. With a mean training time of less than three hours, it is encouraging that cadets are impacted to the extent that they realize they must spend greater cognitive effort developing the ability to predict what was likely to happen next. With increased training, and additional scenarios, it is likely that knowledge stores and schemata could be activated, reducing the mental workload required for the development of these higher levels of SA.

Additional validation tests and training effectiveness evaluations are needed, not only to increase the sample size, but also to identify areas where training will produce the greatest improvements in warfighter SA. Three significant findings from the present research effort that have important implications for future research and development are:

1. CD-based training programs can impact performance in field exercises,
2. Training can be targeted specifically to enhance SA, and
3. Even small amount of training can produce positive results.

Future research and testing should focus on replicating these finding to determine where the program has been successful in improving SA, and where further improvements are needed. Increasing the number and variety of scenarios in the SA Trainer would also be of benefit in developing additional, richer knowledge stores for new Platoon Leaders to call upon during actual Infantry missions.

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Appendix A: SA Trainer User's Manual

SA TECHNOLOGIES
SA TRAINER &
SA PLANNER
User's Manual



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SA TRAINER

&

SA PLANNER



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The purpose of these training modules is to teach some of the skills needed to improve Situation Awareness (SA) through the completion of realistic, mission-based scenarios.

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Getting Started

To get started you must do the following:

- Install the program
- Log In
- Select a Training Module
- Read the Introduction
- Begin a Scenario by:
 - Read the OPORD
 - Review the Graphics
 - Read the Company Commander's Initial Briefing
 - Start the Lesson

System Requirements:

- 1 Internet Explorer 6.0 or later
- 2 QuickTime Plug In
- 3 Minimum Screen Resolution 800 x 600
- 4 Windows 98 or later

The SA Trainer is intended to be run on Windows-based systems, using Internet Explorer 6.0 or later; earlier versions of Internet Explorer or other browsers will not be able to run the program correctly. The system must also have the QuickTime plug in installed to correctly view the video clips. The minimum screen resolution required to properly view the program is 800 x 600. Adobe Acrobat Reader is required to view this User's Manual. Links to download websites for both QuickTime and Adobe Acrobat Reader are included on the CD.

Installation Instructions

IMPORTANT: If you have an Internet filtering program installed on your computer, disable the filter prior to installation.

To install the program, insert the CD into your CD drive. If you do not have Adobe Acrobat Reader on your computer, make sure you have an active Internet connection, then select "Install Adobe Acrobat Reader." Follow the directions on the website to install this program. Next, to run the videos in the program, you must have QuickTime installed. If it is not already installed on your computer, make sure you have an active Internet connection, then select "Install QuickTime." Follow the directions on the website to install QuickTime.

To install the SA Trainer and SA Planner, copy the folder titled SATRAINER to your hard drive by right clicking on the folder icon, then selecting "Copy" from the list. Open the My Computer icon and find the letter identifying your hard drive. Open the hard drive by double clicking on the Drive icon. Right click inside the drive window, and select "Paste" from the list to paste the SATRAINER folder onto your hard drive. Once the folder is copied onto your hard drive, create a shortcut to the program on your desktop by opening the SATRAINER folder on your hard drive, right clicking on the file called SATRAINER.html and dragging this file, keeping the right button depressed, from the folder onto your desktop. From the pop-up menu, select "Create shortcut here."

To avoid a message on each video asking you to restore your MIME type association, either make QuickTime your default viewer or check the box that says, "Do not prompt in the future."

Running the Program

To start the program, you will either double click on the shortcut you created on your desktop, or, if you choose not to create a shortcut, you will have to open your hard drive, (from My Computer, select the letter corresponding to your hard drive), open the SATRAINER folder, and double click on the file named SATRAINER.html, to bring up the log-in screen.

Log In

When you first bring up the SA Technologies Training Modules, a login window will appear (see Figure 1). On this window are two key-in fields entitled, "Full Name" and "Password". In the "Full Name" field, enter your first and last name (up to 50 characters). In the "Password" field, enter your password. ***These fields are not case sensitive.*** Once you have entered your name and password, click on the login button to begin.

Full Name: joe ranger

Password: *****

LOG IN

Figure 1. Example Login Window

Select a Training Module

Once you have logged in, a new screen will appear and you will select either the SA Trainer or the SA Planner by clicking on the appropriate button. The modules are independent, so either training module can be accessed first.

SA Trainer

Welcome to the SA Trainer

Platoon Leaders, welcome to the SA Technologies SA Trainer Module. The purpose of this module is to improve the processes you implement to develop and test your Situation Awareness (SA) in realistic, mission-based scenarios. SA is usually defined as a three-level process consisting of:

- Perception – what you see, hear, feel, taste, or smell
- Comprehension – what these things mean to you
- Projection – how these things will impact you in the future

In this training module, we will teach you to think of these three levels of SA as you move through a simulated mission. The terminology we will use in this training program will represent the three levels of SA, but will do so in a way that is more applicable to the Infantry setting. In this program, you will learn to ask yourself the following questions as you continually evaluate your SA:

- **WHAT?**
 - What did I see, hear, feel, taste, or smell?
 - When did it happen?
 - What was I told?
 - Who told me?
- **SO WHAT?**
 - What does this mean for my mission?
 - How can I combine this with other information to form a complete picture?
 - Does this agree with other information I have received?
 - Does this support what I think is happening?
 - Do I need to reevaluate other information I have received?
 - How recent is the information?
 - How confident am I in the information?
 - Who or what do I believe?
- **NOW WHAT?**
 - What does this mean for the near future?
 - What will the enemy be doing in the next five minutes?
 - What will other friendly troops be doing in the near future?
 - What am I likely to encounter in the near future?
 - What is the most dangerous thing the enemy could do in the near future?

Upon completion of this module, you will know how to

- Identify the information you received that contributes to SA

- Determine which question each piece of information addresses
 - **What?**
 - **So What?**
 - **Now What?**
- Identify information that confirms your SA
- Identify information that contradicts your SA
- Critically assess your SA

It is important to note what the SA Trainer is NOT. It is not a comprehensive training program designed to give the Infantry Platoon Leader all the skills necessary to lead and fight combat troops. The SA Trainer targets a specific subset of skills critical to success in leading a platoon of Infantry Soldiers. Good situation awareness will not always produce good decisions or actions, however, good SA will certainly improve the likelihood that you will be able to make good decisions, and, therefore, achieve good results.

Module Overview

When you first begin the program, you will be asked to enter your name and select a password. This is how the program tracks your progress. The first time you open the program, you are required to go through the introduction, which will introduce you to the concept of SA in the Infantry domain. Throughout the scenarios, we will be training you to use the terms **What?** **So What?** and **Now What?** to critically evaluate the information you have been given.

After you complete the introduction, you will be able to begin Scenario 1. Each scenario starts with a standard, five-paragraph OPORD. After reading the OPORD, you will be able to view graphics, both with and without control measures on them. After reviewing the graphics, you will be taken to the Commander's Intent/Rules of Engagement (CI/ROE) window, similar to a Commander's briefing. Next, you begin the scenario. As you move through the scenario and encounter items, you will receive feedback from a character we call the SA Ranger. Sometimes this feedback will be in the form of a comment on the actions you choose. For instance, if you attempt to kill a group of civilians, the SA Ranger may appear and tell you that you should not do this. Sometime, this feedback concerns actions that are beyond the scope of the program. For instance, the SA Ranger may take you to make sure you establish security at your LZ. While this is an important thing to do if you are actively engaged in a mission, the SA Trainer provides no way for you to do this in the program. These reminders reinforce some of the things you should consider to enhance your SA in the field.

Some important points to remember:

- This training is geared for Infantry Platoon Leaders.
- This training is geared at improving Situation Awareness, the foundation upon which you base your decisions and actions.
- You will not actually be fighting your platoon.
- Much of the training is in the tips that tell you what you should be considering.
- You receive feedback from the SA Ranger.

- Some feedback regards actions the program will not allow, but you should consider these things in a real mission.
- Training value can be enhanced by completing each scenario multiple times.

The Introduction

The SA Trainer Scenario Selection window will appear immediately after you successfully login. This window contains a list of scenarios available. Before you can begin any scenario, you must complete the introduction. The Introduction provides important information about the purpose of the SA Trainer, the lessons that will be taught, and how the SA Trainer functions. Click on the "Introduction" button to view the Introduction (see Figure 2).

SA Trainer

Introduction

Figure 2. Scenario Selection Window

When you click on the "Introduction" button, the Introduction Window will open. In this window is the first page of a description of the purpose of the program, the training benefits it provides, and an overview of the program operations. At the top of each Introduction window is a "Continue" button. After you read the text in each Introduction window, click on the "Continue" button. This will cause the current-visible window to disappear and the next window to appear. The introduction uses several windows, so you will read and click on the "Continue" button several times. See Figure 3 for an example of a partial introduction window with the "Continue" button.

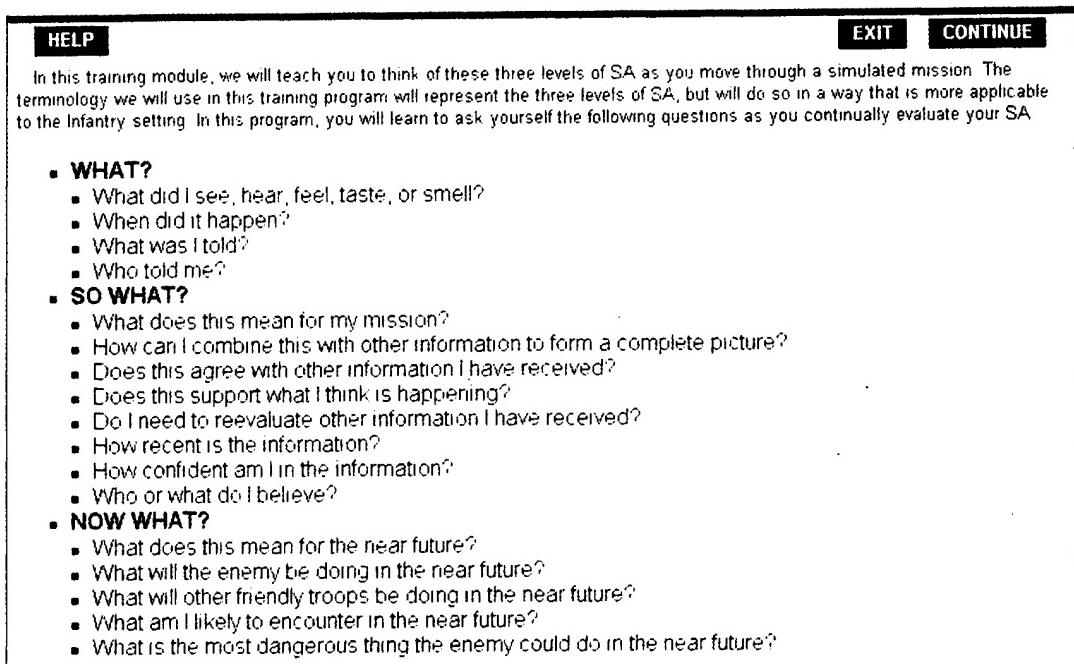


Figure 3. Introduction window

The SA Trainer Scenario Selection window will reappear after you have clicked on the continue button on the last Introduction window.

The Scenario Selection Window

Once the SA Trainer Scenario Selection window reappears, you will notice that there are now additional buttons on this window, listing the Scenario options available to you (see Figure 4). Scenarios are presented in a set sequence, so you cannot access Scenario 2 until you have completed Scenario 1, and so on. You must complete the St. Vincent 1 scenario first, the St. Vincent Scenario 2 second, and the Dakar scenario last.

SA Trainer

Introduction

Scenario 1

Scenario 2

Figure 4. Scenario selection window

Figure 4. Scenario selection window

Clicking on any one of the scenario buttons will start a specific lesson. The scenarios are designed to be sufficiently complex that each can be repeated several times. The scenarios also increase in complexity as you move down the list. The items that you will view, and the actions that occur are dependent upon precisely where you go in the scenario, as well as upon the choices you make. Therefore, by repeating the scenarios, you can access different information. In some scenarios, you can make choices that force you to begin the scenarios over again. Remember, this is a training program, and not a game. As in real life, the actions you take in these training scenarios can influence the outcomes you achieve.

The OPORD

Once you select a scenario by clicking on the appropriate button, the scenario will begin. Each scenario begins with a window that contains information about that scenario in the form of a standard five-paragraph Company OPORD. At the top and bottom of this window is a "Continue" button. After reading the text of the OPORD, click on the continue button. This will cause the current-visible window to disappear and the next window, containing the relevant mission graphics, will appear.

The information contained in the OPORD will be available to you throughout the scenario simply by selecting the OPORD button from the Main Lesson window once the scenario begins.

The Graphics

After reading the OPORD, you will come to a screen that shows the mission's graphics. Across the top, you will have a choice of maps. You can view any map simply by moving the cursor over the button. So, when the cursor is over the Mission Graphics button, you will see a map of the area with the mission graphics on the map. This is the default map, but you can also view a map of the area without these mission graphics, and a map showing a larger area. When you are through with the Graphics, you can move on to the Company Commander's Initial Briefing by clicking on the continue button at the top of the window (see Figure 5).

These graphics will be available to you throughout the mission by selecting the Graphics button from the Main Lesson window once the scenario begins.

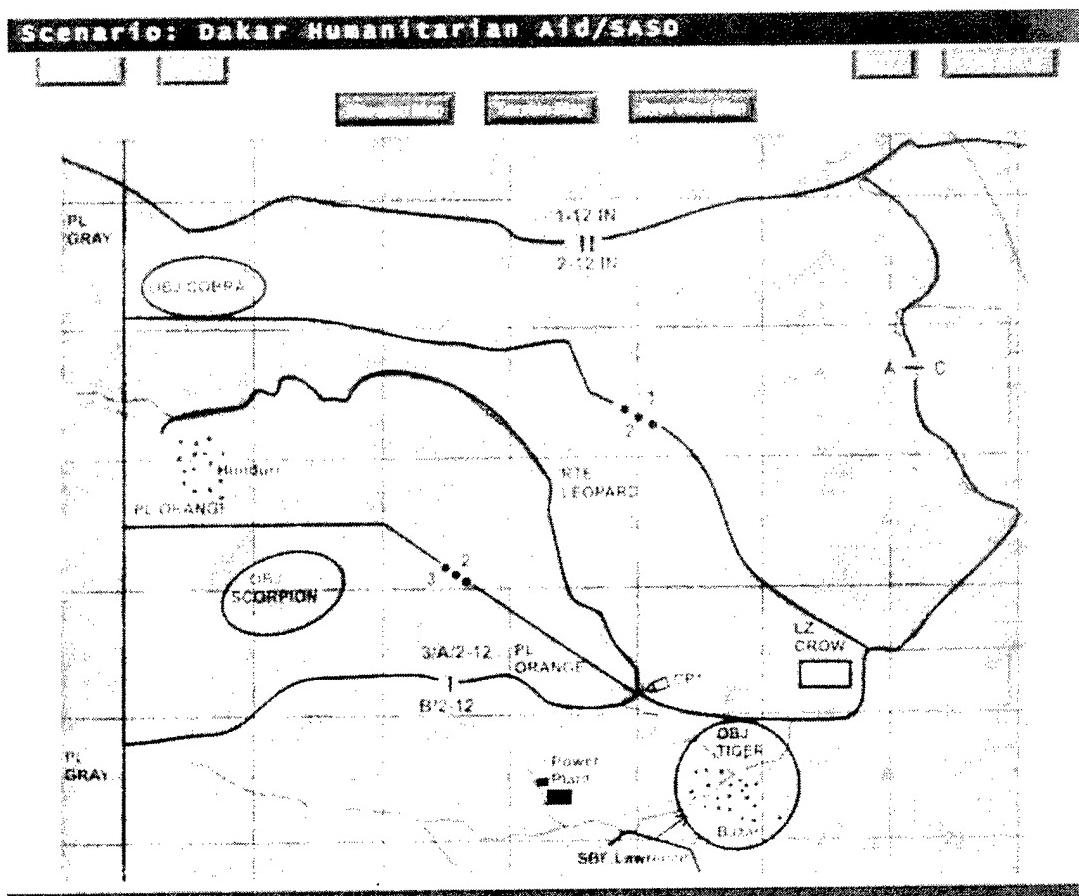


Figure 5. Map with mission graphics

The Company Commander's Initial Briefing

After you select "Continue" from the Graphics window, the Company Commander's Initial Briefing window will appear. This window has text that provides the context for the mission, which is basically a synopsis of the information you would receive in an initial mission briefing from your Company Commander, along with your ROE for the mission. At the top and bottom of the window is a "Continue" button.

The information contained in the CI/ROE will be available to you throughout the mission by selecting the CI/ROE button from the Main Lesson window once the scenario begins.

Start the Lesson

Your virtual SA training officially starts when the Main Lesson window appears on your monitor. This window is easily recognized as it contains a map in most of the right half of the window, buttons across the top and bottom of the window, and a smaller window on the left hand side of the screen providing information about items of interest that you encounter as you

move about the environment. You will use this window throughout the remainder of the lesson.

Using the SA Trainer

Your virtual SA training cannot officially start until you have successfully navigated your way through the windows containing the introduction, OPORD, graphics, and commander's initial briefing. Once these have all been completed, the Main Lesson window will appear on your monitor (see Figure 6).

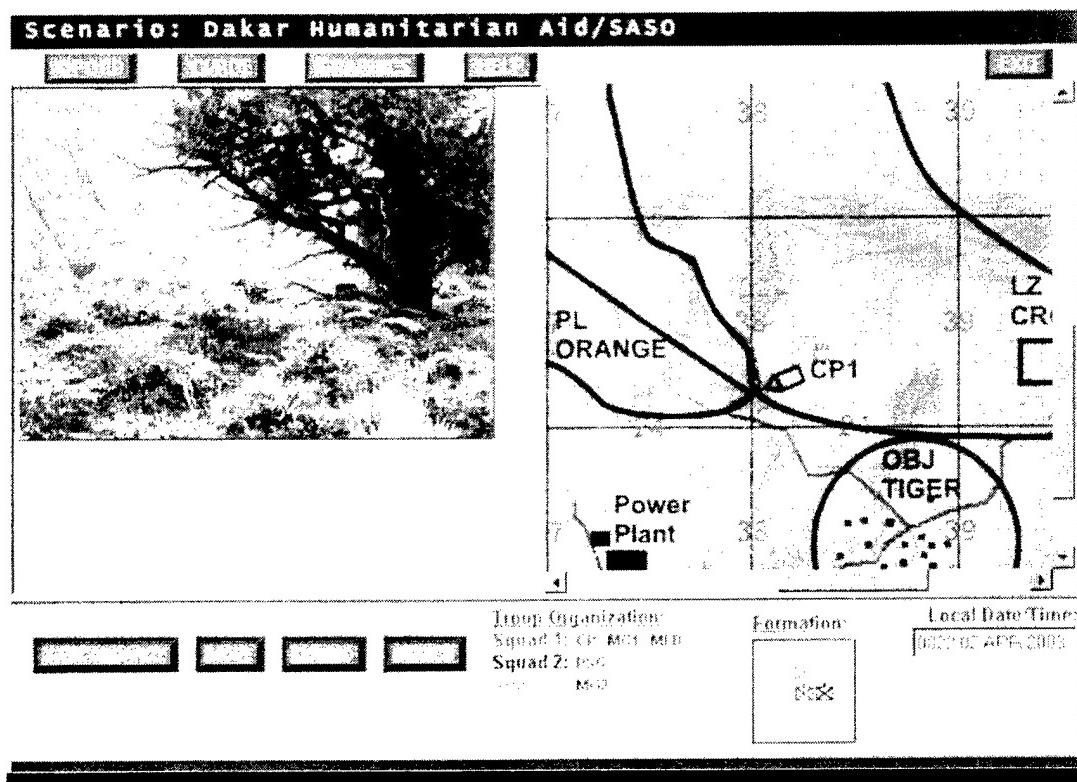


Figure 6. Main lesson window

This window will be used throughout the rest of the lesson. Specific areas of this window are used for specific functions. The center right side of this window displays a map of your area of operations. The center left side of this window is used to display and describe either terrain pictures or situations you encounter as you navigate through your area of operations (AO.) The bottom of this window contains action buttons and informational data displays.

To accomplish your mission, you will be required to navigate (move) your platoon through your AO. As you do so, different items (meaning situations or events) will appear in the left part of this main window. The situations will be presented here in combinations of still images, audio, and video. In response to each event you must select actions (Question, Search, Kill, Detain, etc.) that are appropriate for the current situation. There will be consequences in

response to each action. It should also be noted that all your movements and actions expend valuable time and resources (i.e., ammunition).

Task Organize

When the Main Lesson Window first opens, you will be arriving in your AO. The first thing you must do on arrival is to Task Organize your platoon by clicking on the "Task Organize" button. **TASK ORGANIZE** This will cause a menu with options to appear (see Figure 7).

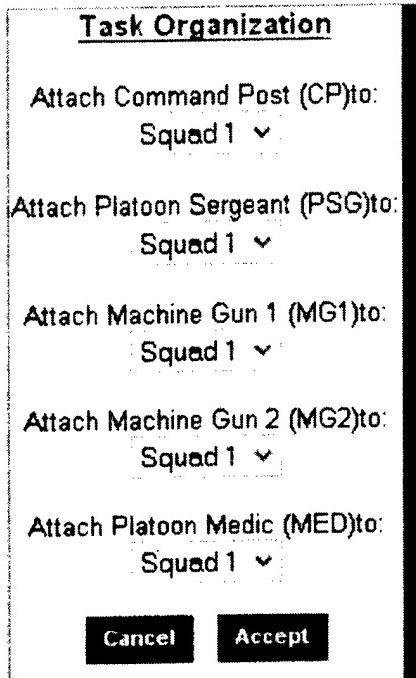


Figure 7. Task organization menu

Using this menu, you must organize your platoon as you feel appropriate for the situation. Once you have organized your platoon, the first situation will appear. You will assign each of two machine guns, your HQ, your Platoon Sergeant and Platoon Medic to a squad. Once this Task organization is complete and you accept your entries, you can begin interacting with the environment and moving through the AO.

To understand the functions provided by the various buttons on this main window, return to the table of contents and click on the appropriate topic.

The OPORD Button

The OPORD button **OPORD** provides a link back to the standard, five-paragraph Company OPORD that you viewed in preparation for the mission. Clicking on this button will bring up the information from your OPORD, so you can refer back to it. This will not affect

your main lesson window, so try it.

The CI/ROE Button

The CI/ROE button **CI/ROE** provides a link back to the information viewed earlier regarding the Commander's Intent. It also provides the Rules of Engagement for the mission, and some context to help you understand what is happening in the region. Clicking on the CI/ROE button will bring up this information and will not affect your main lesson window, so try it.

The GRAPHICS Button

The GRAPHICS button **GRAPHICS** provides a link back to a window containing all the maps that were presented in the introduction of the scenario. This will not affect your main lesson window, so try it.

The HELP Button

The HELP button **HELP** provides a link to a Help window that contains the entire User's Manual. At any time, you can refer to the Help file for information on how the program functions. This will not affect your main lesson window, so try it.

The EXIT Button

Clicking on the EXIT button **EXIT** will end your current lesson, and close the Main Lesson window. If you exit before completing the lesson, then you will have to restart the lesson at the beginning, so this button should be used carefully.

Green Menu Buttons

The (Green) TASK ORGANIZE Button

The task organize button **TASK ORGANIZE** is used to organize your platoon. Clicking on this button will cause a menu to appear as described earlier in this document.

The (Green) MOVE Button

The move button **MOVE** is used to navigate your platoon through your area of operation. Clicking on this button will cause a move menu to appear (see Figure 8).

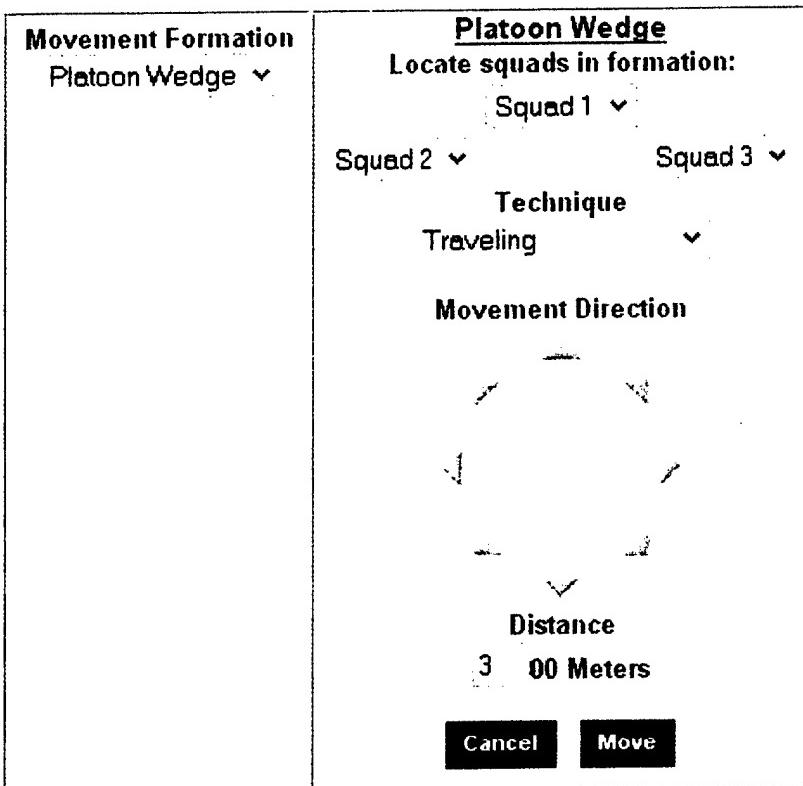


Figure 8. Movement window

Using this menu you may select a movement formation and technique, appropriately organize your squads in the selected formation, select a direction to move, and select a distance to move. Each grid on your map is 100 meters square. To move do, the following:

1. Organize your squads (optional),
2. Select a direction by clicking on an arrow,
3. Key in a distance (in multiples of 100), 3 00 Meters and then
4. Click on the MOVE button.

Move

There is a platoon marker on your map. ☐ Correctly following the steps just described will cause this marker to move. If you fail to enter both a movement direction and distance, your platoon marker will not move. If there are no obstacles, then it will move the specified distance and direction. If it encounters an obstacle or a situation (river, trail, road, town, civilians, enemy Soldiers, etc.) then its movement will be stopped immediately and you will be forced to deal with the situation. **NOTE: This program does not respond to the "Enter" command. If you select a movement direction and distance, then press the Enter key on your keyboard, your platoon marker will not move. You must use the Move button.**

The (Green) COMMO Button

The commo button **COMM** is used to communicate with your platoon, your CO, and adjacent units by requesting and sending reports and requesting resupply. Clicking on the commo button will cause this menu to appear (see Figure 9).

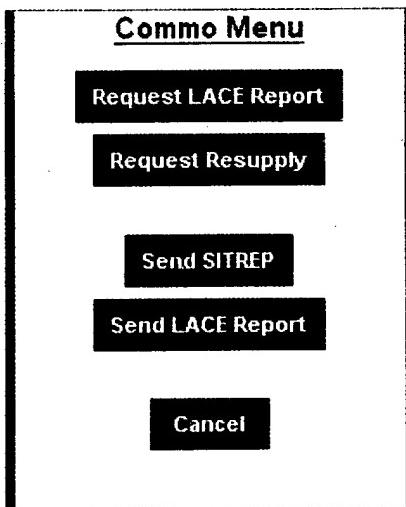


Figure 9. Green Commo (communication) window

This menu contains options that will allow you to send SITREPs, request resupply, and check the status, for each squad in your platoon, of their Liquid (Water), Ammunition, Casualties, and Equipment (LACE) using the LACE report, then relay that status to higher HQ.
NOTE: *You will not be allowed to resupply unless your status is yellow or below on one of the LACE items.* A sample screen is shown for both requesting a LACE report and sending a LACE report. **NOTE:** *You will not be able to send your LACE report until you have entered the correct information. If your information is incorrect, you will be instructed to correct it.*

The (Green) SEARCH Button

The search button **SEARCH** is used to search your current 100-meter grid location. Clicking on this button will initiate a search of your current 100 by 100 meter grid square. Searches consume precious time but may turn up valuable items and information. In general, unless you have a reason to search a particular grid square, it is probably too time consuming, however there is always the chance that you will find something of value when you conduct a search.

Red Menu Buttons

The (Red) ACKNOWLEDGE Button

It has been mentioned previously that as you move your platoon through your area of operation you will encounter obstacles and situations. Each time a significant obstacle appears so also will the following buttons: action options, acknowledge, and continue. Some of these situations will trigger an incoming audio message addressed to you. If you receive an incoming audio message addressed to you, you must acknowledge the message by pressing the **ACKNOWLEDGE** button before you can perform any other action.

The (Red) ACTION OPTIONS Button

It has been mentioned previously that as you move your platoon through your area of operation you will encounter obstacles and situations. Each time a significant obstacle appears so also will the following buttons: action options, acknowledge, and continue. Clicking on the action options button **ACTION OPTIONS** will cause an action menu to appear as shown by Figure 10.



Figure 10. Action Options menu

Within this Action Options menu are various action buttons (i.e. DETAIN, QUESTION, KILL, CAPTURE, SEARCH, etc.). Clicking on an action button will cause the action to be initiated. For example, if you encounter one or more civilians, you may want to click on the button labeled QUESTION to see if they will talk and hopefully provide you with some valuable information.

On occasion, you will be told to select one of these buttons to perform some other task. These occasions will always be spelled out in the text in the Situation Window.

Following are a few helpful hints:

- To search a civilian, you must first detain.
- To search an enemy, you must first capture.
- To send a contact report, you must first make enemy contact.
- Kill only as necessary to prevent being killed.
- Acknowledge all audio messages to you.

The (Red) COMMO Button

Within the Action Options menu is another Commo button, the red Commo button, which bring up additional communications options (see Figure 11). From this menu, you can choose to send a SITREP or Contact Report, or to relay the information you have learned to Higher HQ, to your adjacent platoons, or to your own troops within your platoon. You can select one, all, or any combination of these by clicking the box in front, then select Relay to send the message(s).



Figure 11. Red Commo menu

The (Red) CONTINUE Button

Again, as you move your platoon through your AO you will encounter obstacles and situations. Each time a significant obstacle appears so also will the following buttons: action options, acknowledge, and continue. Clicking on the "Continue" button **CONTINUE** is your signal to the computer that you are through dealing with the currently displayed situation. If you have unfinished business then the computer will not accept the Continue and you will be forced to remain and finish dealing with the current event. If the computer accepts your continue, then

one of a few things will occur...

- 1) a new situation will immediately occur (i.e. you will hear an audio message, see a video, see new text, etc.), or
- 2) the previous situation will clear off your screen (end) and the computer will wait for a new command (like a move **MOVE**).

Mission Graphics

For each scenario, a map with relevant mission graphics is included in the Appendix to this User's Manual. These maps can be printed out for use when going through the scenarios.

SA Planner

Introduction to the SA Planner

Welcome to the SA Planner. Successfully conducting Troop Leading Procedures (TLP) is an important part of mission preparation. Failure to complete a critical task of TLP could have disastrous consequences for your mission. Time is always at a premium when preparing for a mission. Depending on the mission, you may have ample time to plan and prepare for your mission using TLP, while at other times you may have very limited time available. Understanding the elements of TLP and the role of each element are critical to successful mission preparation and can mean the difference between victory and defeat. Time management and task prioritization within this process, then is a critical contributing factor to mission success.

The purpose of this training module is to improve your skills in identifying those TLP tasks that should be completed in planning and executing an Infantry mission, determining the amount of time to allocate for each task, assigning the proper personnel to perform each task, and also determining those tasks that are critical to the success of the mission. If you can improve the way you manage time to conduct these tasks, you effectively increase your combat power.

In this training module, you will practice the steps of TLP. At the end of this training module, you will be able to:

- Identify the steps of TLP
- Understand the sequence of TLP and how one task builds upon another
- Identify the critical tasks for mission execution and success
- Determine the amount of time to allocate for each task based on the time available
- Assign the proper personnel to each task.

Program Overview

The purpose of this training program is to help Platoon Leaders develop and improve their skills in identifying the tasks that will need to be completed to successfully accomplish an Infantry mission, along with allocating adequate time to perform those tasks in accordance with the mission parameters. This program employs realistic scenarios presented to the Platoon Leader in the form of a standard, five paragraph Company OPORD. Each OPORD is accompanied by appropriate mission graphics showing the location and terrain for the mission. The Platoon Leader selects the tasks he should plan to complete for each mission. Once the tasks are selected, he will place the tasks into the correct order in which they should be completed, then determine how long each task will take to complete, as well as what member(s) of his platoon will perform each task. For each page where the Platoon Leader makes decisions, the program will provide feedback on any errors or recommended changes. Because the purpose of this program is to provide training, scores will be shown, however the feedback provided will give the Platoon Leader information, which will help him improve his performance in subsequent scenarios.

Log In to the Program

When you open the program, the first screen you will see is the Log In Screen. To access the program, you must enter your name and select a password. The program will then automatically track your progress through the scenarios, presenting the next in the series, rather than one you have already completed. When you have entered your correct Log In information, press Continue to move to the next screen.

Mission Scenarios

After logging in, you will move directly to the OPORD for your current mission. The top of the page shows the name of the scenario, along with the platoon you are leading in the current mission. For each OPORD, you will play the role of the Platoon Leader for more than one platoon, so it is important to remember which platoon you are leading for each mission. The OPORD is shown in a standard, five paragraph format, with sections for Situation, Mission, Execution, Service and Support, and Command and Signal. A Help button is located at the top of the page, referring back to these instructions if you have questions.

When you have finished reading the OPORD, you can either Exit or Continue. Exiting at this point will not save any information from the current scenario. If you have completed other scenarios, however, information from those missions will be saved. If you choose to continue, you will go to the Mission Graphics screen. The information from the OPORD will be available throughout the remainder of the exercise, so you will be able to refer back to it whenever necessary.

Mission Graphics

For each mission, several graphics in the form of terrain maps will be provided. Most missions have three maps, but some may have more or less. The default map will provide terrain information along with operational graphics showing pertinent details such as obstacles, routes, blocking positions and drop zones. Each scenario will also have a map showing only the terrain, without the operational details, usually accompanied by a map giving a broader picture of the area. Moving the pointing device over each map name brings that map to the front for viewing.

At the bottom of the page you can choose to either Exit or Continue. Exiting at this point will not save any information from the current scenario but information from any previously completed scenarios will be saved. If you continue, you will go to the Task Selection Screen.

Task Selection

On the Task Selection Screen, you will identify those tasks you should plan to perform to successfully accomplish your mission. From the complete list of possible tasks, you will identify only those tasks you should plan for in preparing for and executing your current mission. Select the tasks to be performed by clicking the box in front of each task to place a check in that box, if you check a box by mistake, or change your mind, clicking the box a second time removes the check mark. When you are satisfied that you have selected all the tasks you should plan to perform for this mission, choose Continue at the bottom of the screen to receive feedback on your choices before moving to the next screen. A sample screen shot showing this task is presented in Figure 12.

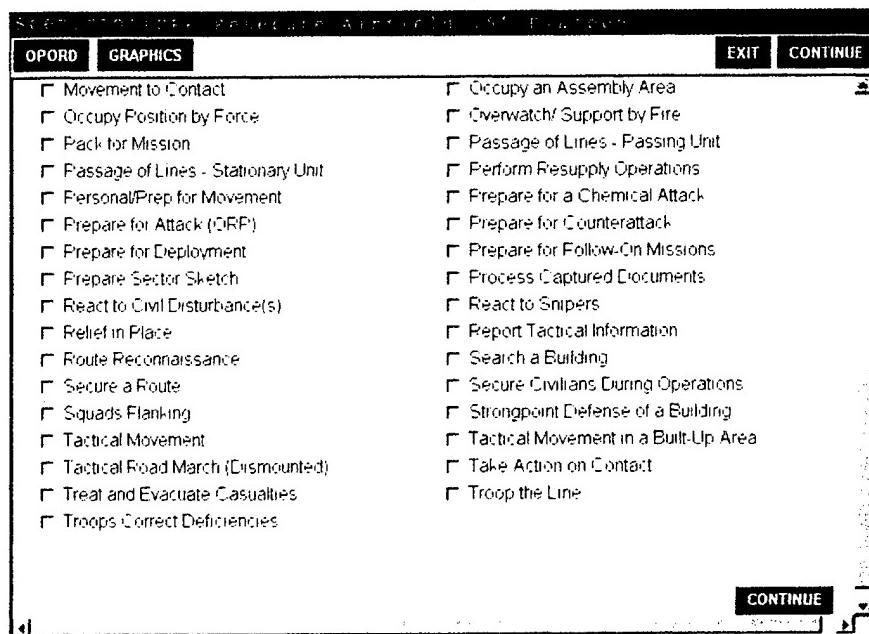


Figure 12. Task Selection Window

If you choose to exit before you correct any errors and press continue, any work you have done on this screen will have to be repeated when you return to the program, but information from any correctly completed screens will be saved.

Task Sequence - Planning

For this Task Sequence Screen, you will place each planning task into the correct sequence by placing a number from 1 to 14 in front of each item (see Figure 13). (These planning tasks are those tasks that should be done in a specific order and need to be completed prior to mission infiltration.) Place a number 1 in front of the task you will complete first, a number 2 in front of the task to complete second, etc. Once you place the number in the box and move to the next item, the task will appear in the list box on the right side of the screen in the place you've assigned it. When you have finished placing each item in order and are satisfied with your list, click on the "Continue" button to receive feedback on your list and move to the next screen. You can refer back to the OPORD or mission graphics at any time by selecting the tabs across the top of the screen. A sample of the task sequencing screen is shown below in Figure 13. **NOTE: Placing a number outside the range of 1 to 14 may result in errors that will require restarting the scenario.**

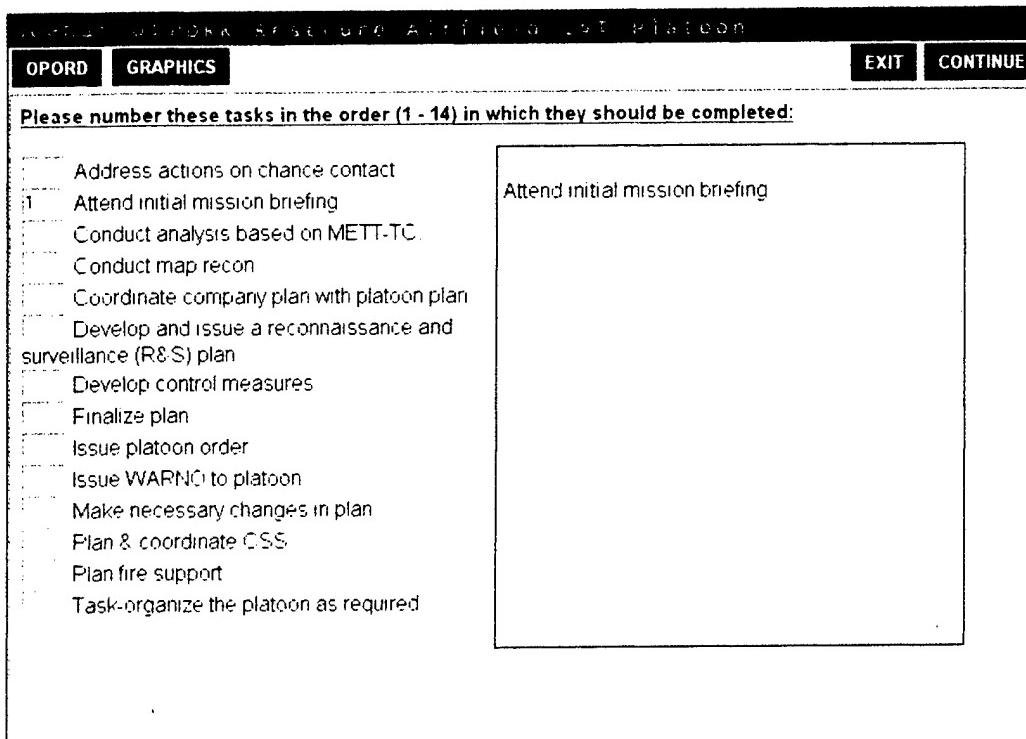


Figure 13. Task Order window

If you choose to exit before you correct any errors and press continue, any work you have done on this screen will have to be repeated when you return to the program, but information from any correctly completed screens will be saved.

Task Timing and Assignment - Planning

In the Task Timing and Assignment Screen, you will determine, for each planning task, the amount of time in minutes that you should allocate for that task. (Planning tasks are those tasks that need to be completed prior to mission infiltration.) While it is possible that any task could encounter problems, causing it to take extra time, the purpose of this program is to identify standard time values that you use should use for planning purposes. Do not identify the worst-case scenario time, i.e. how long the task could require if serious problems were encountered, but rather how long you should plan for the task under the conditions outlined in the OPORD. You can refer back to the OPORD or mission graphics at any time by clicking on the tabs across the top of the screen (see Figure 14).

Above the list of tasks will be a sentence indicating the amount of time you have to plan and prepare for your mission. Use this time frame to determine the amount of time in minutes to allocate for each task. This screen also includes an hours-to-minutes calculator to help you convert long tasks into minutes. Enter the number of minutes you plan to spend on each task in the first box on the left beside the listed task.

In addition to determining the amount of time to allot for each task, you will also identify the correct personnel to perform each task. If you assign a task to the wrong person, an error message will appear and you will have to choose again. For instance, issue Platoon Order cannot be assigned to a squad leader.

When you have completed assigning tasks and allocating time, select continue to receive feedback on your time allocation. At this time, computations will be done to determine whether you have allotted more than the allowed time to any platoon personnel. In addition, if you have allocated more or less than the recommended time to any task, a message will appear indicating the recommended time range for each task.

If you choose to exit before you correct any errors and press continue, any work you have done on this screen will have to be repeated when you return to the program, but information from any correctly completed screens will be saved.

NOTE: You must enter a time for every task. If you choose to assign no time to a task, enter a 0. The program will not accept a blank space.

SFC - SAW PLATOON - REVERSE AND AIRFIELD - 1ST PLATOON

		OPORD	GRAPHICS	EXIT	CONTINUE
Please indicate in minutes how much time each of these planning tasks will take and who will perform each task. Items in red will affect the mission clock, items in black can be performed at the same time as other tasks & will not change the mission clock.					
You have 12 hours to plan and prepare for your mission.					
0	<input type="text"/>	<input checked="" type="checkbox"/> Attend initial mission briefing			
0	<input type="text"/>	<input checked="" type="checkbox"/> Issue WARNO to platoon			
0	<input type="text"/>	<input checked="" type="checkbox"/> Conduct analysis based on METT-TC			
0	<input type="text"/>	<input checked="" type="checkbox"/> Conduct map recon			
0	<input type="text"/>	<input checked="" type="checkbox"/> Plan fire support			
0	<input type="text"/>	<input checked="" type="checkbox"/> Plan & coordinate CSS			
0	<input type="text"/>	<input checked="" type="checkbox"/> Develop control measures			
0	<input type="text"/>	<input checked="" type="checkbox"/> Address actions on chance contact			
0	<input type="text"/>	<input checked="" type="checkbox"/> Task-organize the platoon as required			
0	<input type="text"/>	<input checked="" type="checkbox"/> Develop and issue a reconnaissance and surveillance (R&S) plan			
0	<input type="text"/>	<input checked="" type="checkbox"/> Finalize plan			
0	<input type="text"/>	<input checked="" type="checkbox"/> Coordinate company plan with platoon plan			
0	<input type="text"/>	<input checked="" type="checkbox"/> Make any necessary changes in plan			
0	<input type="text"/>	<input checked="" type="checkbox"/> Issue platoon order			
0	<input type="text"/>	<input checked="" type="checkbox"/> Chow			
0	<input type="text"/>	<input checked="" type="checkbox"/> Issue Squad OPORD			
0	<input type="text"/>	<input checked="" type="checkbox"/> Issue weapons (ammunition domain)			
Time Remaining: 720 Minutes					

Figure 14. Planning task time and personnel assignment

Critical Tasks - Execution

For the Critical Tasks screen (see Figure 15), you must check those items that are critical to mission success by clicking on the box next to the task. While all of these tasks are important, there are some that must be done or the mission cannot succeed. These tasks that are critical to mission success are the tasks that you should select on this screen. When you have finished the mission critical tasks and are satisfied with your list, click on the "Continue" button to receive feedback on your list and move to the next screen. You can refer back to the OPORD or mission graphics at any time by clicking on the tabs across the top of the screen.

If you choose to exit before you correct any errors and press continue, any work you have done on this screen will have to be repeated when you return to the program, but information from any correctly completed screens will be saved.

Scenario: PORK RESCUE Airfield Raid Mission

<p>Please check the tasks that are critical to the execution phase of this mission:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Infiltrate for mission <input type="checkbox"/> Accountability of troops <input type="checkbox"/> Tactical movement <input type="checkbox"/> Prepare for attack <input type="checkbox"/> Breach an obstacle (wire around the airfield) <input type="checkbox"/> Issue FRAGOs <input type="checkbox"/> Handle EPWs <input type="checkbox"/> Report tactical information <input type="checkbox"/> Secure civilians during operations <input type="checkbox"/> Conduct a security patrol <input type="checkbox"/> Prepare for follow-on missions <input type="checkbox"/> Occupy an assembly area <input type="checkbox"/> React to snipers <input type="checkbox"/> Conduct a leader's reconnaissance <input type="checkbox"/> Secure a route <input type="checkbox"/> Maintain security at breach site <input type="checkbox"/> Conduct a deliberate attack <input type="checkbox"/> Consolidate and reorganize <input type="checkbox"/> Treat and evacuate casualties <input type="checkbox"/> Process captured documents/equipment <input type="checkbox"/> Conduct a link-up 	<input style="width: 50px; height: 20px; border: 1px solid black; background-color: black; color: white; font-weight: bold; margin-right: 5px;" type="button" value="EXIT"/> <input style="width: 50px; height: 20px; border: 1px solid black; background-color: black; color: white; font-weight: bold;" type="button" value="CONTINUE"/>
--	--

Figure 15. Critical tasks

Task Timing – Mission Execution

In the Task Timing Screen (see Figure 16), you will determine, for each mission execution task, the amount of time in minutes that you should allocate for that task. (Mission execution tasks are those tasks that are completed after infiltration.) While it is possible that any task could encounter problems, causing it to take extra time, the purpose of this program is to identify standard time values that you should use for planning purposes. Do not identify the worst-case scenario time, i.e. how long the task could require if serious problems were encountered, but rather how long you should plan for the task under the conditions outlined in the OPORD. You can refer back to the OPORD or mission graphics at any time by clicking on the tabs across the top of the screen.

This screen also includes an hours-to-minutes calculator to help you convert long tasks into minutes. Enter the number of minutes you plan to spend on each task in the first box on the left beside the listed task.

When you are satisfied with your choices, select continue to receive feedback on your time allocation. At this time, if you have allocated more or less than the recommended time to any task, a message will appear indicating the recommended time range for each task. **NOTE:** *If you choose to allocate no time for a task, you will have to enter a "0" in the space beside the task, rather than leaving the space blank. The program will not accept any blank spaces.*

If you choose to exit before you correct any errors and press continue, any work you have done on this screen will have to be repeated when you return to the program, but information from any correctly completed screens will be saved.

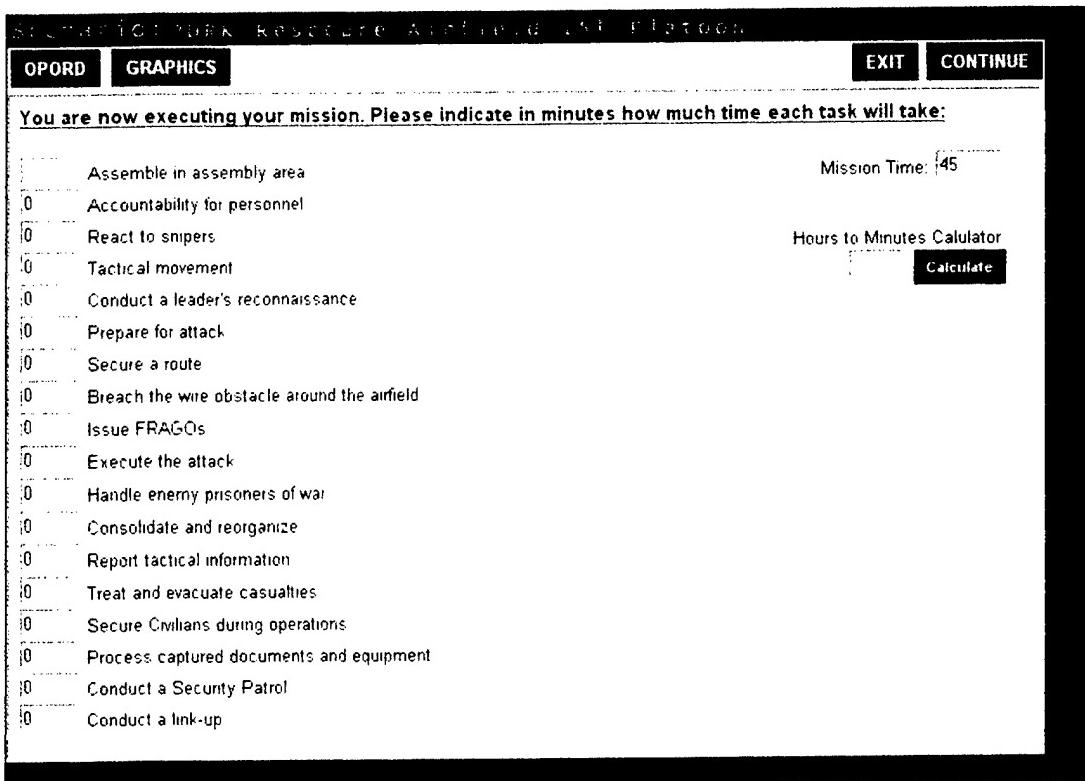


Figure 16. Task Timing13

Thank you for using the SA Technologies SA Trainer and SA Planner. Diligent use of these training modules, and careful application of the principles learned can assist you in developing the superior SA that greatly increases your likelihood of success in the field.

Appendix A: Scenario Mission Graphics

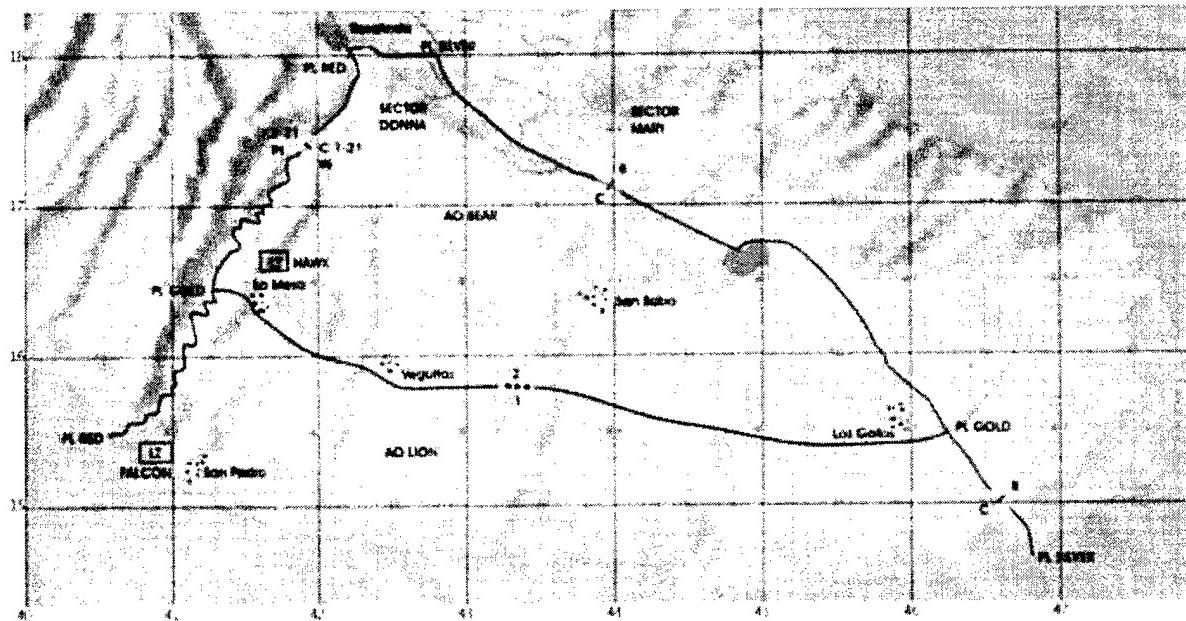


Figure 14. Secure St Vincent, Scenario 1

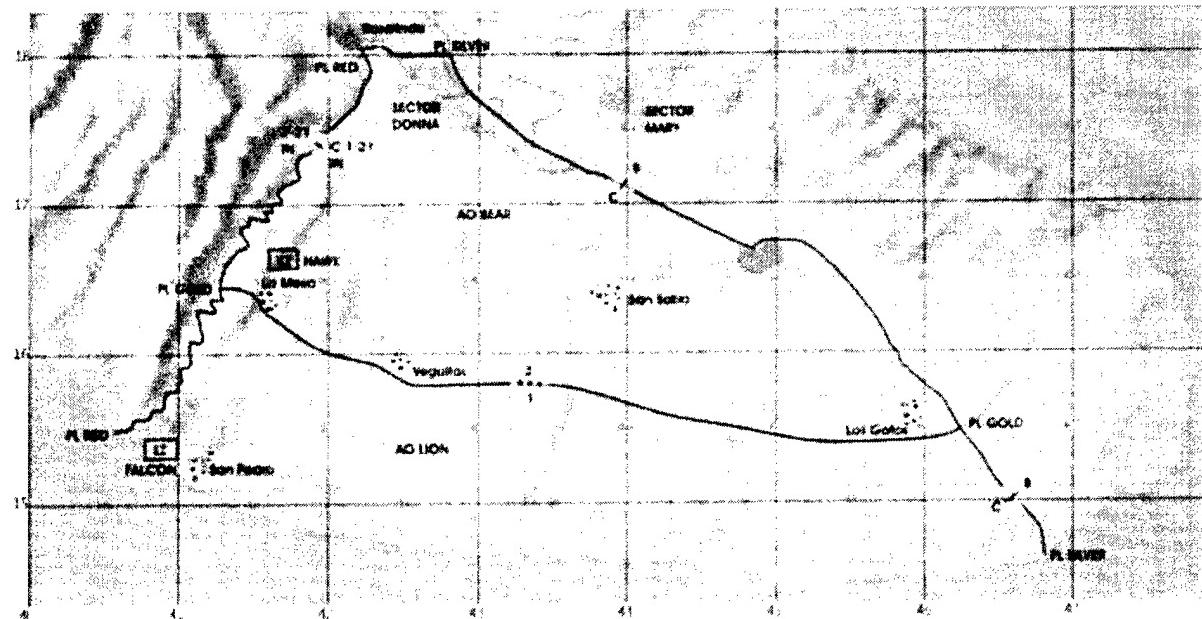


Figure 15. Secure St. Vincent, Scenario 2

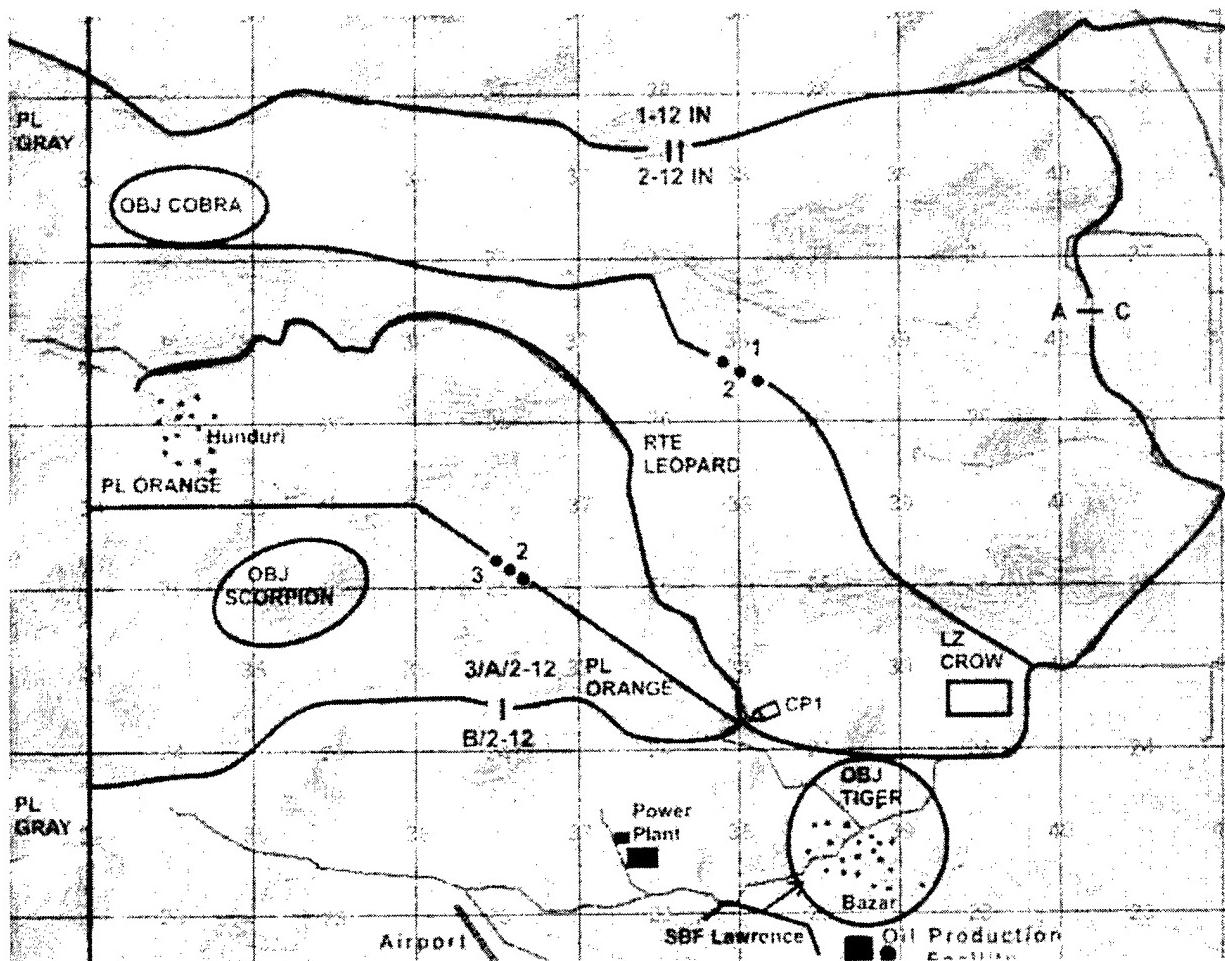


Figure 16. Dakar Humanitarian Aid/SASO, Scenario 3

Appendix B: SA Trainer OPORD and CI/ROEs

Scenario 1 – Secure St Vincent OPORD

1. Situation:

Enemy Forces: SLIM elements are reacting nation-wide to the presence of TF Hammer. They are attempting to consolidate their forces and form small pockets of resistance in the southeast portion of the country. As a show of force and to reassure the population of its commitment to restoring peace, President Mateo wishes to visit San Saba and Los Gatos. Recent intelligence indicates SLIM forces are infiltrating squad size elements in and around those villages in order to create havoc on the visits of the President and to terrorize the villagers.

Uniform and Equipment: SLIM generally wear OD green Tiger Stripe BDUs, with some units wearing black fatigues. There is some mix and match of U.S. BDUs. They mostly have pistols and AK 47 rifles. They do not have any night vision capabilities. They do have some internal communication capabilities, but are not believed to be sophisticated.

Capabilities: They strike in small numbers, generally team and squad size and can move very fast because of their knowledge of the terrain. They are skilled with basic pyrotechnics, have knowledge of several types of explosive construction and have damaged farm equipment and local gas stations. They use small boats on the rivers and along the coastline to conduct direct action and support drug operations.

Weather: Forecast is for clear skies and temperatures in the high 90s and low near 70. No rain expected for the next 4 days. Illumination is 90%.

Terrain: St. Vincent is a semi-tropical island. The terrain varies from gently rolling hills to mountainous ridges. There are many steep cliffs and the island is surrounded by water with many streams throughout the countryside. Most trails and roads run north/south. There is little vehicle movement on the island, but Highway 1 runs northeast/southwest through the capital and basically cuts the island in half.

2. Mission: Company Mission, No Change.

3. Execution:

- a. **Concept of Operation:** NLT 0600 18 October 2002, 1st Platoon air assaults into LZ Hawk and clears San Saba and Los Gatos of SLIM elements in order to prevent hostile actions and to allow St. Vincent Militia to provide security for Presidential visit. 1st

Platoon is the main effort. On order, establish blocking penetrations at BP 1 and BP 2 to prevent infiltration of SLIM elements into villages. 3rd Platoon clears AO Lion to PL Silver in order to eliminate SLIM threat on A Company's right flank. 2nd Platoon clears AO Bear to PL Blue in order to eliminate SLIM threat on 1st Platoon.

(1) Fires: of company mortars to 1st Platoon. On order, 3rd platoon.

b. Coordinating Instructions:

(1) MOPP level: 0

(2) PIR:

- a. 1st and 2nd Platoon coordinate fire controls at CP 1.
- b. 1st Platoon, coordinate handover of both villages face to face with SVM Company Commander in Los Gatos NLT 1800 17 October 2002.

4. Service and support:

- a. Company Trains located at LZ Hawk.
- b. Litter and ambulatory casualties get evaced to company CCP at LZ Hawk.
- c. LOGPAC to go out at to PLT CPs at 0600 tomorrow. Resupply of CL I, CL V, and water.

5. Command and Signal:

- a. Company CP located at CF 162465.
- b. Three red star clusters indicate enemy base camp sighted.

Scenario 2 – Secure St Vincent OPORD

1. Situation:

Enemy Forces: St. Vincent Liberation Movement (SLIM) has been conducting terrorist operations throughout the countryside of the island of St. Vincent. They are using strong-arm tactics in order to recruit members to their cause. They often attack and ambush St. Vincent militia forces and cut off militia lines of communications, making it nearly impossible for the militia to operate and protect the villages and civilians. Their stated objective is the complete overthrow of the elected democratic government of St. Vincent and the installment of a militant regime led by Ramon Villa. SLIM obtains financing for its weapons and war efforts through drug operations, primarily marijuana. The elected leader of St. Vincent, President Juan Tomas Mateo, has asked the U.S. to assist the St. Vincent Army (SVA) in eradicating these terrorists from their country, and restoring freedom of movement and operations for the St. Vincent militia. They have also asked the U.S. to assist in eliminating the island's marijuana crop.

Uniform and Equipment: SLIM generally wear OD green Tiger Stripe BDUs, with some units wearing black fatigues. There is some mix and match of U.S. BDUs. They mostly have pistols and AK 47 rifles. They do not have any night vision capabilities. They do have some internal communication capabilities, but are not believed to be sophisticated.

Capabilities: They strike in small numbers, generally team and squad size and can move very fast because of their knowledge of the terrain. They conduct tactics similar to our old LRSD units. They are skilled with basic pyrotechnics, have knowledge of several types of explosive construction and have damaged farm equipment and local gas stations. They use small boats on the rivers and along the coastline to conduct direct action and support drug operations.

Weather: High temperatures have been in the 90's and the lows in the mid 60's. Humidity is moderate, but heavy after a rainfall. There is rainfall about 2 days per week. The sun rises around 0630, and the sun sets around 1930. Illumination for this week is 70%, except in areas of triple canopy jungle around bodies of water and in most coastal regions surrounding rivers.

Terrain: St. Vincent is a semi-tropical island. The terrain varies from gently rolling hills to mountainous ridges. There are many steep cliffs and the island is surrounded by water with many streams throughout the countryside. Most trails and roads run north/south. There is little vehicle movement on the island, but Highway 1 runs northeast/southwest through the capital and basically cuts the island in half.

Friendly Forces: Task Force (TF) Hammer, 1st Brigade, 7th Infantry Division, has been deployed to the island of St. Vincent in order to assist the current

government in maintaining law and order and to eradicate the SLIM movement. 1st Battalion, 21st Infantry is the TF main effort with a mission to clear the southern portion of the island of SLIM activity and to destroy the SLIM base camp controlling the region in order to allow St. Vincent militia the freedom to operate and restore peace. The exact location of the base camp is unknown, but recent intelligence indicates that it may be located somewhere southeast of the capital city, Rosalinda. 2nd Battalion clears the north portion of the island to restore local militia control, and 3rd Battalion clears the capital city, Rosalinda, in order to protect the local government.

Higher Unit Mission: NLT 16 October 2002, at 0530L, 1st Bn, 21st Inf, clears Sector Mary of SLIM elements and destroys the SLIM base camp in order to restore freedom of movement to St. Vincent militia forces. A Company is the battalion main effort and will raid SLIM base camp to destroy SLIM forces. B Company clears Sector Sue to allow A Company to destroy SLIM base camp. D Company is the battalion reserve with priority mission to support A Company in destroying SLIM base camp.

2. Mission: C Company, 1st Battalion, 21st Infantry conducts air assault NLT 0530L, 16 October 2002, to clear Sector Donna of SLIM activity in order to allow A Company to destroy SLIM base camp.

3. Execution:

Intent: My intent is to clear Sector Donna of SLIM activity while building trust and rapport with locals. Use your interpreter as needed. I want to kill or capture any SLIM found in sector in order to make sure they can not influence A Company's raid when the base camp is located.

a. Concept of Operation: At 0530 local time on 16 October, C Company air assaults into Sector Donna with 1st Plt landing at LZ Falcon and 2nd and 3rd Plts at LZ Hawk. 1st and 2nd Plt will clear in sector from west to east. Search villages and attempt to locate SLIM forces and identify signs of activity in Sector Donna. 3rd Plt occupies village at LZ Hawk and maintains reaction force for reinforcement in sector.

(1) Maneuver: 1st Platoon is the main effort and clears AO Lion in order to eliminate SLIM threat on A Company's right flank. 2nd Platoon clears AO Bear in order to eliminate SLIM threat on 1st Platoon. 3rd Platoon is the company reserve with priority mission to support 1st Platoon to destroy SLIM strong points in AO Lion. 2 UH60s remain on station at LZ Hawk for committing reserves.

b. Coordinating Instructions:

- (1) MOPP level: 0 Take masks only.
- (2) PIR: Composition and disposition of the enemy forces in the area. Check out all villages in your area and all local gas stations for tampering with fuel or charges.

4. Service and support:

- a. All personnel will carry a 2-day supply of MREs and water. Resupply per LOGPAC through XO. Don't drink the local water.
- b. Basic load of Class V in effect. No Dragons will be taken. Each platoon draws 6 AT4s.
- c. Medical support will be the platoon medic with all combat lifesavers. Company CCP is at LZ Hawk. Air medevac is available from battalion aid station but request it through the company CP.

5. Command and Signal:

- a. Company CP is with 3rd Platoon at LZ Hawk. Current chain of command is XO, 1st PL, 2nd PL, 3rd PL.
- b. Current SOI is in effect. Operate secure on Company net.

Scenario 1 & 2 – Secure St Vincent CI/ROE

Company Commander's Initial Briefing

Gentlemen:

We are here at the request of the St. Vincent president, President Juan Tomas Mateo, and the people of St. Vincent. SLIM guerrillas are conducting operations against the St. Vincent militia and cutting off lines of communications to parts of the island. SLIM is attempting to overthrow President Mateo's government in order to set up a military dictatorship and empower drug lords in the growing and exportation of marijuana and other drugs.

The leader of SLIM, Ramon Villa, is the great grandson of an honored military leader, General Jose Kobaro. 50 years ago, General Kobaro led a band of rebel Soldiers and successfully toppled a brutal dictator, initiated free democratic elections, and supported the first elected president during a rough and violent transitional period. General Kobaro served three properly elected Presidents before his death in 1967. Villa is using his family ties to recruit local villagers into his forces. It is believed that Villa uses the southeast part of the island as his base of operations. St. Vincent militia intelligence believes that a cave or tunnel network may exist that allows SLIM to hide and move undetected.

Since the mid 1980's, St. Vincent has experienced and survived some very tough economic times. Heated arguments persist about life before, and after, democracy, and which is better for the country. These issues are only made worse by the extensive poverty that exists for the average villager.

Our presence here in St. Vincent will center on restoring peace, protecting the government, and destroying SLIM forces. We will focus on the following during all of our operations here:

- Gather information about SLIM's strength, organization, and operational plans.
- Find the location of SLIM's operations base and headquarters.
- Eliminate SLIM's ability to finance their military operations.
- Completely destroy SLIM's military capabilities, and break their will to conduct future military operations.
- Establish favorable conditions to assist St. Vincent militia in restoring order in areas under SLIM control.

RULES OF ENGAGEMENT

NOTHING IN THESE RULES OF ENGAGEMENT LIMITS YOUR RIGHT TO TAKE APPROPRIATE ACTION TO DEFEND YOURSELF AND YOUR UNIT.

- A. YOU HAVE THE RIGHT TO USE FORCE TO DEFEND YOURSELF AGAINST ATTACKS OR THREATS OF ATTACK.
- B. HOSTILE FIRE MAY BE RETURNED EFFECTIVELY AND PROMPLY TO STOP A HOSTILE ACT.
- C. WHEN U.S. FORCES ARE ATTACKED BY UNARMED HOSTILE ELEMENTS, MOBS AND/OR RIOTERS, U.S. FORCES SHOULD USE THE MINIMUM FORCE NECESSARY UNDER THE CIRCUMSTANCES AND PROPORTIONAL TO THE THREAT.
- D. YOU MAY NOT SEIZE THE PROPERTY OF INNOCENT VILLAGERS TO ACCOMPLISH YOUR MISSION.
- E. DETENTION OF CIVILIANS IS AUTHORIZED FOR SECURITY REASONS OR IN SELF-DEFENSE. DETAINED CIVILIANS MAY BE SEARCHED AND QUESTIONED FOR INFORMATION.
- F. BE MINDFUL OF HARMING WOMEN AND CHILDREN. USE THE MINIMUM FORCE NECESSARY IF THEY APPEAR HOSTILE. ONLY USE DEADLY FORCE IF IMMINENT DANGER IS LIKELY.
- G. SEARCHES OF VILLAGES, HOMES, AND MODES OF TRANSPORTATION ARE AUTHORIZED. ASK PERMISSION FIRST AS A GESTURE. IF PERMISSION IS DENIED, CONDUCT A SEARCH ANYWAY. SHOW RESPECT FOR THE OWNER/INHABITANTS AND THEIR PROPERTY. USE MINIMUM FORCE NECESSARY TO PREVENT INTERFERENCE WITH SEARCHES.
- H. CONTRABAND, INCLUDING WEAPONS, COMMUNICATIONS EQUIPMENT AND SUSPICIOUS DOCUMENTS, WILL BE CONFISCATED, TAGGED, AND TURNED OVER TO THE UNIT S2 OR TASK FORCE MP COMPANY.
- I. DESTROY ANY EQUIPMENT, STRUCTURES OR ITEMS USED FOR MARIJUANA CULTIVATION. REPORT THE LOCATION OF MARIJUANA FIELDS TO BATTALION S3.

I. CONTACT THE BATTALION AID STATION FOR MEDICAL CARE FOR CIVILIANS. PROVIDE ON THE SPOT EMERGENCY CARE ONLY IF CONDITIONS ARE LIFE THREATENING.

Scenario 3 – Dakar Humanitarian Aid/SASO OPORD

1. Situation:

Enemy Forces: Kafji Tribal Forces (KTF) have become extremely active in the last 30 days in the mountain passes of the Republic of Dakar. Two humanitarian aid convoys were ambushed a week ago, attempting to get aid to the Lungadi tribe. KTF snipers have also positioned themselves along the road from Bazari to Hunduri to disrupt refugee travel and any attempt by the Dakar Army to reinforce Hunduri in any significant numbers. KTF has cut power lines between Hunduri and Bazari on two occasions. There is a squad of Dakar Army Soldiers in Hunduri to show a presence and collect information on KTF in the area. The KTF has managed to make the single road access to Hunduri impassable to any UN traffic.

Uniform and Equipment: KTF wear desert camouflage similar to ours as well as local tribal and civilian garb. They are armed with Russian-made weapons, primarily AK 47s, SKS machine guns, and bolt action rifles.

Capabilities: KTF are very resilient and capable of striking in squad and platoon size elements. At times they will travel in civilian pick-up trucks, vans or horseback to points near their objectives and then attack. They have some 82mm mortar support and heavy machine guns have been found in weapons caches. KTF forces use the native terrain well, including many caves found in the region. We can expect attacks on our forces by squad or platoon size KTF elements. They will most likely conduct hit and run operations to test our resolve and to determine our engagement tactics.

Weather: Temperature forecast ranges from the highs in the mid-50s to the lows in the high 20s at night with little rain expected. Higher elevations may be snow covered. Some wadis become impassable due to flashfloods and mudslides from fast moving storms and snow thaws. Sunrise is 0530 and sunset is 1800. Illumination is expected to be 50% and increasing for the next 4 days.

Terrain: Terrain is extremely varied, with high desert plains and mountain ranges. The desert floor is rocky and has numerous wadi sections that are hard to see from a distance. Vegetation is limited to low grasses and scrub.

Friendly Forces: TF Arrowhead, 3rd Bde, 39th ID (Air Assault) has been deployed into the region to destroy KTF forces in order to allow UN aid efforts to reach tribes unhindered. 1st Bn, 12th IN secures Dakar International Airport in order to allow humanitarian aid to flow into the country unimpeded. 2nd Bn, 12th IN is the TF main effort and destroys KTF forces in zone in order to protect UN aid convoys from KTF attack. 3rd Bn, 12th IN secures the oil production facilities in Kaham to prevent KTF disruption of Dakar infrastructure assets.

Higher Unit Mission: The Battalion Commander's intent is to seize control of Bazari and eliminate the KTF in sector so that no threat is posed to humanitarian efforts. Areas will be cleared with particular attention to locating cave networks or other places where KTF may hide and launch attacks. Encourage the support of the populace by limiting collateral damage and working closely with native tribal leaders and members.

NLT 0400L 2 April , 2nd Bn, 12th IN conducts air assault and destroys KTF forces in zone in order to protect UN aid convoys from KTF attack. B Company is the initial main effort and seizes Bazari, OBJ Tiger, vic TU 387236 to prevent KTF attacks on UN aid convoys. D Company supports by fire from SBF Lawrence to allow B Company to seize OBJ Tiger. A Company clears Route Leopard from CP1 to Hunduri in order to prevent KTF attacks on UN aid convoys. NLT 0600L 4 April, C Company guards UN convoy during movement thru Bazari to Hunduri to protect UN aid convoy from KTF attack.

2. Mission: NLT 0800L 2 April, A Co, 2-12 IN conducts air assault into LZ Crow to clear Route Leopard from CP 1, vic TU 380242 to Hunduri in order to prevent KTF attacks on UN aid convoys.

3. Execution:

Intent: I want to clear the route of any KTF forces that might attempt to disrupt aid convoys. I want to secure positions north and south of Hunduri to prevent any KTF attacks from those areas. Ensure civilians understand our role as you come in contact with them. I don't want C Company ambushed as it escorts aid to Hunduri. Search and clear all caves, ridgelines and other areas where KTF forces might hide and launch operations.

a. Concept of Operation: The Company will air assault into LZ Crow, once B Company has secured Obj Tiger. 2nd Platoon will clear Route Leopard itself while 3rd Platoon occupies a position in the south and 1st Platoon occupies a position in the north. 2nd Platoon will secure Hunduri once Route Leopard is cleared and coordinate with Dakar Army element. 1st and 3rd Platoons will monitor KTF activity from their positions in sector. We will remain in sector until C Company arrives in Hunduri with the UN aid convoy.

(1) Maneuver: Company air assaults into LZ Crow. 2nd Platoon is the main effort and clears Route Leopard from CP1 to Hunduri in order to prevent KTF attacks on UN aid convoys. 2nd Platoon coordinates fire control with B Company at CP1, vic TU 380241. 3rd Platoon occupies OBJ Scorpion vic TU 353250 in order to allow 2nd Platoon to

clear Route Leopard. 1st Platoon occupies OBJ Cobra vic TU 346273 in order to allow 2nd Platoon to clear Route Leopard.

(2) Fires: Priority of Bn mortars to B Company, on order to 2nd Platoon. Priority of Company mortars to 3rd Platoon.

b. Coordinating Instructions:

(1) MOPP level: 0

(2) PIR:

- a. LZ Crow is at TU 395243
- b. Each Platoon has an interpreter from the local region to assist in dealing with the civilian population.

4. Service and support:

- a. Company trains located at LZ Crow.
- b. 2 day supply of CL I and water per man. Basic load of CL V per man with 6 AT 4's per platoon. Resupply every 48 hours per company SOP.
- c. Company CCP is LZ Crow with air MEDEVAC available through Company CP to Battalion.

5. Command and Signal:

- a. Company CP with 1st Platoon, chain of command in effect. XO and 1SG with trains.
- b. Current SOI in effect. Red star cluster is contact. Use smoke or IR strobe to mark LZ.

Scenario 3 – Dakar Humanitarian Aid/SASO CI/ROE

Company Commander's Initial Briefing

Gentlemen:

The country of Dakar has requested UN assistance in reestablishing security, in assisting humanitarian efforts and in ridding itself of the Kafji Tribal Forces (KTF) that threaten the stability of the government. The KTF represent the radical Kafji people, a minority nomadic tribe that has long sought for independence and its own homeland in the vast regions of northern Dakar. It specifically desires to settle in the oil rich portion of the region and has threatened to disrupt oil production and distribution through direct action against oil wells and refineries and power production facilities. The KTF refuses to work jointly with the Sultan and the government of Dakar to find a peaceful solution to the conflict.

The situation is further complicated by an 18 month long drought that has devastated Dakar agriculture and its ability to provide for its people. As a result of the drought, non-government agencies and humanitarian efforts by the UN are underway to relieve the suffering. The Lungadi tribe has been hit especially hard by the drought and relief efforts are critical to the tribe's survival.

The KTF is a terrorist militia. Operating in small-sized forces, they strike random targets of opportunity. Dakari Army attempts to locate and destroy KTF forces have been unsuccessful because of a lack of resources and the KTF's ability to use the mountainous terrain of its homeland to hide its forces and strike at will. Dakari Army vehicles and Soldiers have been ambushed and their weapons and equipment stolen. The KTF also strikes humanitarian aid convoys, stealing food, water, and medical supplies to support its own forces.

The Dakari government lacks the military and infrastructure resources to both protect its infrastructure assets from KTF attack and provide for the humanitarian needs of its people. Dakar is also considered a stabilizing influence in the region and the UN fears that continued unrest in Dakar will spill over into neighboring countries. As a result, the UN has dispatched an international security force to protect the humanitarian aid operation and to assist the Dakari Army in putting down the KTF and establishing peace in the region.

Our presence here in Dakar will center on finding and destroying KTF forces and on securing humanitarian aid operations in order to eliminate the threat to stability and survival in the region. We will focus on the following during all of our operations here:

- Gather information about KTF strength, organization, and operational plans.
- Find the location of KTF forces and destroy KTF military capabilities.
- Disrupt any attempts by KTF to strike against Dakari infrastructure targets.
- Secure, protect and assist humanitarian aid efforts in our area of operations.

RULES OF ENGAGEMENT

NOTHING IN THESE RULES OF ENGAGEMENT LIMITS YOUR RIGHT TO TAKE APPROPRIATE ACTION TO DEFEND YOURSELF AND YOUR UNIT.

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- F. BE MINDFUL OF HARMING WOMEN AND CHILDREN. USE THE MINIMUM FORCE NECESSARY IF THEY APPEAR HOSTILE. ONLY USE DEADLY FORCE IF IMMINENT DANGER IS LIKELY.
- G. SEARCHES OF VILLAGES, HOMES, AND MODES OF TRANSPORTATION ARE AUTHORIZED. ASK PERMISSION FIRST AS A GESTURE. IF PERMISSION IS DENIED, CONDUCT A SEARCH ANYWAY. SHOW RESPECT FOR THE OWNER/INHABITANTS AND THEIR PROPERTY. USE MINIMUM FORCE NECESSARY TO PREVENT INTERFERENCE WITH SEARCHES.
- H. CONTRABAND, INCLUDING WEAPONS, COMMUNICATIONS EQUIPMENT AND SUSPICIOUS DOCUMENTS, WILL BE CONFISCATED, TAGGED, AND TURNED OVER TO THE UNIT S2 OR TASK FORCE MP COMPANY.

I. CONTACT THE BATTALION AID STATION FOR MEDICAL CARE FOR CIVILIANS. PROVIDE ON THE SPOT EMERGENCY CARE ONLY IF CONDITIONS ARE LIFE THREATENING.

J. RESPECT LOCAL TRIBAL LEADER'S AUTHORITY TO THE EXTENT THAT MISSION ALLOWS.

K. BE AWARE OF LOCAL RELIGIOUS CUSTOMS, SOCIAL NORMS AND PLACES/SYMBOLS OF RELIGIOUS OR HISTORICAL SIGNIFICANCE. AVOID UNNECESSARY COLLATERAL DAMAGE TO ANY RELIGIOUS OR HISTORICAL PLACE/SYMBOL. YOU DO HAVE A RIGHT TO DEFEND YOURSELF AGAINST HOSTILE FIRE COMING FROM A RELIGIOUS SITE.

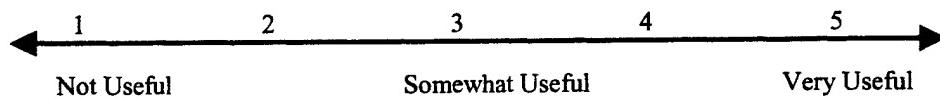
Appendix C: Survey Instruments

Training Module Evaluation Questionnaire

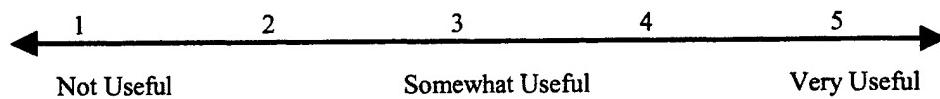
ID Number: _____ Module Name: SA Trainer

Rank: _____

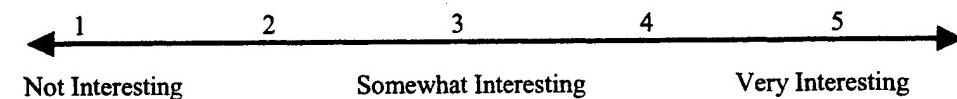
1. How useful did you find the training module for your level of experience?



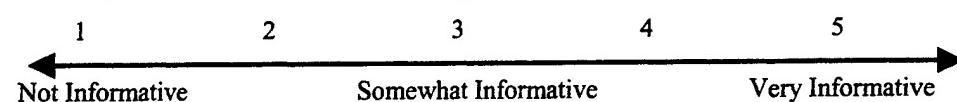
2. How useful did you feel the training module would be for a new Platoon Leader?



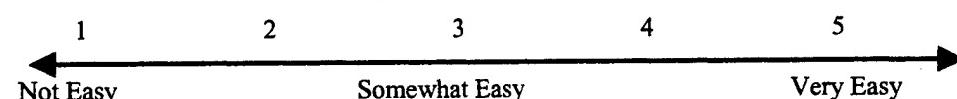
3. How interesting did you find the training module?



4. Overall, how informative was the training module?



4. Overall, how easy was the training module to use?



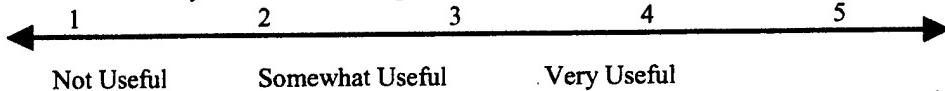
4. How can the module be improved? Can we add any additional information?

SA Training Module Evaluation Questionnaire (Field Test Version)

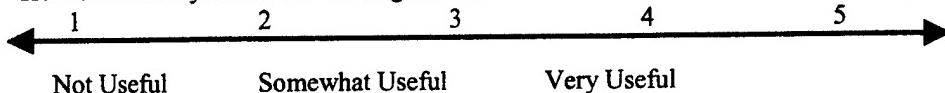
ID Number: _____ Module Name: _____

Rank: _____

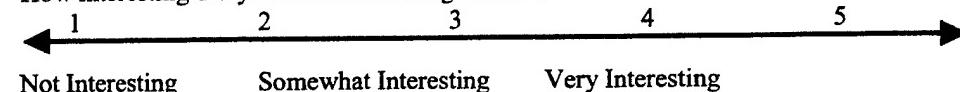
1. How useful did you find the training module for your level of experience?



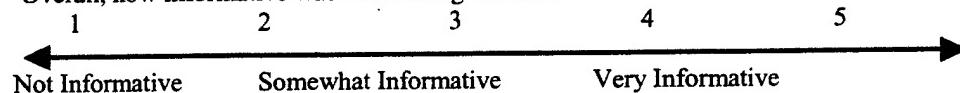
2. How useful did you feel the training module would be for a new Platoon Leader?



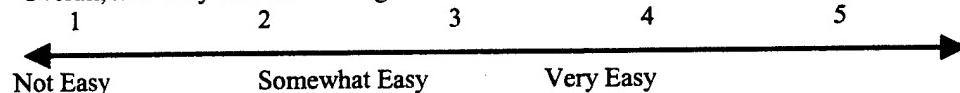
3. How interesting did you find the training module?



4. Overall, how informative was the training module?



5. Overall, how easy was the training module to use?



6. Which module(s) have you practiced?

Scenario 1 Scenario 2 Both

7. How many times have you practiced these modules? _____

8. Approximately how much total time in hours have you spent on the SA trainer? _____

9. Was there anything that was particularly difficult to use or understand?

10. How can the module be improved? Can we add any additional information?

Lag nr: _____ *Tropp:* _____ *Bokstavkode:* _____ *Tid:* _____

Lagfører: Ja Nei *Veileder Lag:* _____

SAGAT Queries – Initial Halt

Instructions: Answer each question with the best answer. If you do not know the answer, there is no penalty for guessing, so it is better to guess than to leave the item blank.

1. Indicate the 6-digit map grid for your current location. _____
2. What is the current distance to your objective in meters? _____
3. How close are you to your planned route in meters? _____
4. How close are you to your planned time schedule? (Check one and indicate minutes, if applicable.)
 - On time
 - Ahead of schedule by _____ minutes
 - Behind schedule by _____ minutes
5. What is the range and bearing to your next waypoint?
 - a. Range in meters _____
 - b. Bearing (Check one)
 - North
 - Northeast
 - East
 - Southeast
 - South
 - Southwest
 - West
 - Northwest
6. How many enemy Soldiers are within 500 meters of your current location?
7. Indicate the 6 digit grid location of your rally point. _____
8. What is the bearing to the nearest enemy? (Check one)
 - North
 - Northeast
 - East
 - Southeast
 - South
 - Southwest
 - West
 - Northwest
9. What is your mission? _____
10. How many civilians are within 500 meters of your current location? (Check one)
 - 0
 - 1-5
 - 6-10
 - 11-15
 - 16-20
 - >20
11. Does the enemy know your location? Circle one
Yes No
12. How spread out is your squad in meters? (Check one)
 - 0-50
 - 50-100
 - 100-200
 - 200-400
 - 400-1000

13. What will the enemy do in the next 15 minutes? (Check all that apply)

- Nothing
- Defend
- Retreat
- Attack
- Get Reinforcements
- Harassing fires
- Retaliate
- Move
- Other

14. What are the enemy's weapons capabilities?

- Machine Guns
- Indirect Mortar Fire
- Small Arms
- Artillery
- Light armored vehicles
- Antitank Weapons
- Pyrotechnics

15. What tactics will the enemy employ?

- Hit and Run
- Observation Only
- Direct Action
- Terrorist Activities
- Withdraw
- Die in Place
- Snipers

16. Who has the advantage in the current situation?

- My unit
- Enemy
- Neither

17. What impact is fatigue having on my mission? (Check all that apply)

- No impact
- Light & noise discipline poor
- Speed reduced
- Defensive posture poor
- Alertness to enemy reduced
- Unable to execute mission
- Judgment impaired

18. Complete the following LACE report: (Indicate the percentage of issued load remaining)

- a. Liquid
- 80-100%
 - 60-79%
 - 40-59%
 - <40%

- b. Ammunition
- 80-100%
 - 60-79%
 - 40-59%
 - <40%

Casualties (enter the number of casualties in each category)

Ambulatory _____

Litter _____

Dead _____

- c. Equipment
- 80-100%
 - 60-79%
 - 40-59%
 - <40%

Lag nr: _____ *Tropp:* _____ *Bokstavkode:* _____ *Tid:* _____

Lagfører: Ja Nei *Veileder Lag:* _____

SAGAT Queries – End of Exercise

Think back before the assault, when final orders were given, and answer these questions based on WHAT YOU KNEW AT THAT TIME.

Instructions: Answer each question from memory. Do not refer to maps, notes, orders, etc. If you do not know the answer, there is no penalty for guessing, so it is better to guess than to leave the item blank.

1. Indicate the 6-digit map grid for your location. _____
2. What was the distance to your objective in meters? _____
3. How close were you to your planned time schedule? (Check one and indicate minutes, if applicable.)
 On time
 Ahead of schedule by _____ minutes
 Behind schedule by _____ minutes
4. How many enemy Soldiers were within 500 meters of your location? _____
5. Indicate the 6 digit grid location of your rally point. _____
6. How many civilians were within 500 meters of your current location? (Check one)
 0
 1-5
 6-10
 11-15
 16-20
 >20
7. What did you expect the enemy to do? (Check all that apply)
 Nothing
 Defend
 Retreat
 Attack
 Get Reinforcements
 Harassing fires
 Retaliate
 Move
 Other
8. What impact was fatigue having on the mission? (Check all that apply)
 No impact
 Light & noise discipline poor
 Speed reduced
 Defensive posture poor
 Alertness to enemy reduced
 Unable to execute mission
 Judgment impaired

Mission Awareness Rating Scale (MARS)

Instructions. Please answer the following questions about the mission you just completed. Your answers to these questions are important in helping us evaluate the effectiveness of this battle simulation. Check the response that best applies to your experience.

The first four questions deal with your *ability* to detect and understand important cues present during the mission.

1. Please rate your ability to *identify* mission-critical cues in this mission.

- very easy – able to identify all cues
- fairly easy – could identify most cues
- somewhat difficult – many cues hard to identify
- very difficult – had substantial problems identifying most cues

2. How well did you *understand* what was going on during the mission?

- very well – fully understood the situation as it unfolded
- fairly well - understood most aspects of the situation
- somewhat poorly – had difficulty understanding much of the situation
- very poorly – the situation did not make sense to me

3. How well could you *predict* what was about to occur next in the mission?

- very well – could predict with accuracy what was about to occur
- fairly well – could make accurate predictions most of the time
- somewhat poor – misunderstood the situation much of the time
- very poor – unable to predict what was about to occur

4. How aware were you of *how to best achieve* your goals during this mission?

- very aware – knew how to achieve goals at all times
- fairly aware – knew most of the time how to achieve mission goals
- somewhat unaware – was not aware of how to achieve some goals
- very unaware – generally unaware of how to achieve goals

The last four questions ask how *difficult* it was for you to detect and understand important cues present during the mission.

5. How difficult – in terms of mental effort required - was it for you to *identify* or detect mission-critical cues in the mission?

- very easy – could identify relevant cues with little effort
- fairly easy – could identify relevant cues, but some effort required
- somewhat difficult - some effort was required to identify most cues
- very difficult – substantial effort required to identify relevant cues

6. How difficult – in terms of mental effort – was it to *understand* what was going on during the mission?

- very easy – understood what was going on with little effort
- fairly easy – understood events with only moderate effort
- somewhat difficult – hard to comprehend some aspects of situation
- very difficult – hard to understand most or all aspects of situation

7. How difficult – in terms of mental effort – was it to *predict* what was about to happen during the mission?

- very easy – little or no effort needed
- fairly easy – moderate effort required
- somewhat difficult – many projections required substantial effort
- very difficult – substantial effort required on most or all projections

8. How difficult – in terms of mental effort – was it to decide on *how to best achieve* mission goals during this mission?

- very easy – little or no effort needed
- fairly easy – moderate effort required
- somewhat difficult – substantial effort needed on some decisions
- very difficult – most or all decisions required substantial effort

Situation Awareness Behaviorally Anchored Rating Scale

INSTRUCTIONS: Rate the squad leader for this mission on each of the following 19 questions. If you are not sure how to rate the squad leader on a particular question, make your best judgment and rate him or her accordingly. If you have any questions, please consult with the data collector.

1. Solicits information from subordinates

1	2	3	4	5		
very poor		poor		borderline	good	very good

2. Communicates key information to squad members

1	2	3	4	5		
very poor		poor		borderline	good	very good

3. Asks for pertinent information during initial mission briefing

1	2	3	4	5		
very poor		poor		borderline	good	very good

4. Assigns tasks to squad members based on ability

1	2	3	4	5		
very poor		poor		borderline	good	very good

5. Communicates his situation assessment to squad members

1	2	3	4	5		
very poor		poor		borderline	good	very good

6. Locates self at vantage point to observe main effort at the objective

1	2	3	4	5		
very poor		poor		borderline	good	very good

7. Deploys squad to maintain good communication

1	2	3	4	5		
very poor		poor		borderline	good	very good

8. Utilizes scouts tactically to gather information

1	2	3	4	5		
very poor		poor		borderline	good	very good

9. Utilizes a leader's recon to assess terrain and situation and to finalize plan

1	2	3	4	5		
very poor		poor		borderline	good	very good

10. Establishes multiple courses of action in advance of the objective

1 very poor	2	3 poor	4	5 borderline	good	very good
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11. Communicates courses of action with squad members

1 very poor	2	3 poor	4	5 borderline	good	very good
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12. Uses maps to route find and monitor progress toward objective

1 very poor	2	3 poor	4	5 borderline	good	very good
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13. Maintains appropriate squad security posture throughout mission

1 very poor	2	3 poor	4	5 borderline	good	very good
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14. Conducts appropriate battle damage assessment after actions on the objective

1 very poor	2	3 poor	4	5 borderline	good	very good
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15. Identifies likely areas of enemy contact and listening post/observation post sites and communicates this to squad members

1 very poor	2	3 poor	4	5 borderline	good	very good
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16. Seeks confirmation of information received

1 very poor	2	3 poor	4	5 borderline	good	very good
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17. Selects the appropriate type and amount of equipment and ammunition for the mission

1 very poor	2	3 poor	4	5 borderline	good	very good
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18. Maintains knowledge of time constraints and mission event timing

1 very poor	2	3 poor	4	5 borderline	good	very good
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19. Overall situation awareness rating (Situation awareness is the squad leader's ability to perceive and understand what is going on during the mission, and to predict what is about to occur in the near future)

1 very poor	2	3 poor	4	5 borderline	good	very good
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SABARS Post-Questionnaire

Please answer the following questions about the performance of the squad leader during the mission that was just completed.

1. The performance of the squad as a whole on this mission was
 - a. far below average
 - b. below average
 - c. average
 - d. above average
 - e. far above average

2. The squad leader's decision making during this mission was
 - a. far below average
 - b. below average
 - c. average
 - d. above average
 - e. far above average

3. The squad leader's ability to communicate with members of the unit during this mission was
 - a. far below average
 - b. below average
 - c. average
 - d. above average
 - e. far above average

4. I would rate the overall performance of this platoon or squad leader as
 - a. far below average
 - b. below average
 - c. average
 - d. above average
 - e. far above average

Please answer the following questions about the SABARS rating form you just completed.

5. SABARS included questions important in assessing situation awareness for small Infantry teams

- a. strongly agree
- b. agree
- c. neither agree or disagree
- d. disagree
- e. strongly disagree

6. SABARS was easy to use

- a. strongly agree
- b. agree
- c. neither agree or disagree
- d. disagree
- e. strongly disagree

7. My ratings on SABARS could be used to give useful feedback to the leader on his or her mission performance

- a. strongly agree
- b. agree
- c. neither agree or disagree
- d. disagree
- e. strongly disagree

8. Providing feedback to squad leaders on their situation awareness skills is a valuable training goal

- a. strongly agree
- b. agree
- c. neither agree or disagree
- d. disagree
- e. strongly disagree

APPENDIX D: Acronyms

AAR—After Action Review

ANOVA —Analysis of Variance

AO—Area of Operations

ARI – Army Research Institute

Bn – Battalion

CI –Commander's Intent

CO—Commanding Officer

COA—Course of Action

CP – Command Post

CSS – Combat Service Support

EPW – Enemy Prisoner of War

FRAGO – Fragmentary Order

HQ – Headquarters

Inf – Infantry

ISAT – Infantry Situation Awareness Training

KTF – Kafji Tribal Forces

LACE – Liquid (Water), Ammunition, Casualties, and Equipment

LZ – Landing Zone

MARS – Mission Awareness Rating Scale

MED – Platoon Medic

METT-TC – Mission, Enemy, Terrain, Troops, Time available and Civilian considerations

MG – Machine Gun

OBJ – Objective

O/C – Observer/Controller

OPORD – Operational Order

PC – Personal Computer

PL – Phase Line

Plt – Platoon

PSG – Platoon Sergeant

R&S plan – Reconnaissance and Surveillance plan

ROE – Rules of Engagement

SA – Situation Awareness

SABARS – Situation Awareness Behaviorally Anchored Rating Scale

SAGAT – Situation Awareness Global Assessment Technique

SASO – Stability and Support Operation

SBIR – Small Business Innovative Research

SCORM – Sharable Content Object Reference Model

SITREP – Situation Report

SLIM – St Vincent Liberation Movement

SME – Subject Matter Expert

SOP – Standard Operating Procedures

SRP – Standard Reporting Procedures

TLP – Troop Leading Procedures

WARNO – Warning Order

UN – United Nations

VIC - Vicinity